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When called to guide a patient through an illness the physician should be constantly a watchman, and a therapeutist only when necessity arises.

A TEXT-BOOK

OF

PRACTICAL THERAPEUTICS,

WITH ESPECIAL REFERENCE TO THE

APPLICATION OF REMEDIAL MEASURES TO DISEASE

AND THEIR

EMPLOYMENT UPON A RATIONAL BASIS.

BY

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SIXTH EDITION, ENLARGED, THOROUGHLY REVISED AND LARGELY RE-WRITTEN.

LEA BROTHERS & CO.,
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1897.

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1897

THIS VOLUME

IS DEDICATED TO

DR. J. WILLIAM WHITE,

PROFESSOR OF CLINICAL SURGERY IN THE UNIVERSITY OF PENNSYLVANIA,

AS AN

EVIDENCE OF FRIENDSHIP AND ESTEEM,

BY

THE AUTHOR

PREFACE TO THE SIXTH EDITION.

ALTHOUGH the number of copies printed of the fifth edition of this work was almost three times as great as was the case with earlier editions, they have been rapidly exhausted and the author has been called upon within two years to prepare the manuscript for the sixth edition. The original object of the book was to present the physician and student with a well-digested and concise, yet practically useful, statement of the best methods of treating disease. It was written for the reason that the author appreciated as a practitioner and teacher that many of the works upon this subject contain a vast amount of information so compiled as to be almost useless because the reader is forced to discover for himself what is worthy of his confidence. For this reason remedies which are so rarely employed as to be curiosities are not discussed in this volume, and the space so saved is utilized in rendering rational the application of well-tried remedies both new and old.

Many books after appearing in several editions lose a large part of their original value because the statements that have been added are so confused with the original text that its conciseness is destroyed. Recognizing this fact, the author has rewritten a very considerable portion of the present edition in order to render the statements in the text clear and concise. He has also endeavored so to arrange the work that it can be readily used in conjunction with his *Text-book of Practical Diagnosis.*

As this volume is not intended as a year-book for the record of all things in therapeutics, only those measures which have proved useful and reliable in therapeutics are included. For this reason nothing is said of the use of serum in the treatment of many infectious processes in which it has proved itself of little or no avail, for instance in streptococcus infection or tuberculosis, or in croupous pneumonia.

PHILADELPHIA, 222 SOUTH FIFTEENTH STREET,
SEPTEMBER, 1897.

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PREFACE TO THE FOURTH EDITION.

THE Fourth Edition of this work having been called for in less than four years after the appearance of the first, the Author has taken advantage of the opportunity to rewrite and add to many of the articles on drugs, remedial measures, and diseases, and to insert practical information concerning the value and prescription of the really useful new remedies. Articles on Methylene Blue, Chloralose, Pyrogallol, Condurango, Convallaria, Duboisine, and other remedies have been added to the part of the work dealing with drugs. In the part dealing with Remedial Measures other than Drugs articles have been written on Hypodermoclysis and Enteroclysis, Lavage, and upon Mineral Springs and Climatic Treatment. The latter article is not intended to be exhaustive, but to give the general practitioner an idea of the therapeutic value of certain well-known resorts, in order that he may offer rational advice to his patients as to where they should go in search of health. Several new articles in the part devoted to the Treatment of Individual Diseases have been inserted, and new or modified applications of the older remedies carefully noted throughout the entire book.

In addition to these changes, the work has been revised in such a way as to render it uniform with the new U. S. Pharmacopœia. As that authority directs the use of the metric system, the doses of all drugs are given in both Apothecaries' and Metric weights, thus (15 to 30 grains [1.0–2.0]), so that the physician may conveniently use either system, but it is to be clearly understood that where the doses are expressed in both systems, side by side, no attempt has been made to make the metric amounts more than approximate the quantities given in Troy weight.

The fact that one fluidounce is nearly represented by 30 cc., while one solid ounce is represented approximately by 32 grammes, causes confusion. The author has therefore adopted the method advised by Oldberg in his valuable and well-known "Manual of Weights and Measures," and used 32 cubic centimetres or grammes as equivalent to 1 ounce, whether liquid or solid.

The Author desires to express his appreciation of the care with which Dr. de Schweinitz has revised the articles on Diseases of the Eye; Dr. Hirst, those on the Puerperal State; and Dr. Martin, those on Syphilis and Genito-urinary Diseases and Antisepsis. The articles on the treatment of diseases of the upper air-passages have been rewritten or revised by the Author.

It is hoped that this new edition will prove even more useful than its predecessors to the doctor who needs a book for ready reference in daily practice.

PHILADELPHIA, 222 SOUTH FIFTEENTH STREET.

PREFACE TO THE FIRST EDITION.

THE object of this book is to provide the physician or undergraduate student of medicine with a reliable guide in the study of Therapeutics, or the application of remedial measures for the cure of disease. It has been written because, in the belief of the author, most of the text-books on this subject treat of it as if the student were already a skilled physician or experimental pharmacologist. As a consequence, two classes of undergraduate readers exist. One finds that the mixture of science and empiricism is too difficult for him to fathom, and is hopelessly confused; the other simply learns the remedies and doses by heart, and gives drugs with little idea as to what they are to do. Further than this, the physician is often at a loss to decide when a remedy is indicated, even though his theoretical knowledge of the subject be very thorough. Thus, he is told that ammonium chloride is a remedy in bronchitis, but the exact stage at which it is to be employed is often not stated; or he knows that digitalis does good in cases of cardiac disease, but fails to recognize the fact that it is only when compensation is lacking that the drug is needed. For this reason Part IV. has been written, not with the object of providing a rigid system for treating disease, but rather for the purpose of bringing together the best remedies, and of showing how and why they are given.

Rational therapeutics at the present day does not consist in a knowledge of doses and the materia medica, but exists as a complex art in which knowledge and its proper application, based on common-sense principles, go hand in hand. The treatment of "symptoms as they arise" by the employment of remedies recommended by some eminent authority is a variety of empiricism whose existence has depended largely on the fact that many physicians of the past have either been so ignorant as to be led where a writer willed, or so slothful as to be willing to let others think for them. Scientific research has so largely opened up to every one the possibility of using drugs with a distinct idea of the reason for their employment that the writer has endeavored to bring together in a readable form the combined results of laboratory and bedside experience, thinking the time ripe for such a task. It is true that several other books give, in a more or less thorough manner, a *résumé* of the physiological action of the drugs of which they treat, but in even the best of them only the most trained student of pharmacology can discover the close relationships which exist between the results reached by the physiologist on the one hand and the clinician on the other. The two parts of the study are usually so divorced by the prolonged mental effort necessitated by the arrangement of the text that the student either ignores the physiological action for the sections on therapeutics, or crams the [illegible] to pass an examination required by the teacher whose course he must follow. As a consequence, too many physicians regard pharmacology simply as a species of mental training, or believe it to be a waste of time and energy. No one can think that the writer of [illegible] will ever deny the value of original research or bedside [illegible], but he does desire to weave science and practice into so [illegible] network that the foundations of experience may be cemented [illegible] mortar of exact knowledge. In some instances, however, [illegible] and practice seem to be absolutely opposed, and only future [illegible] explain the apparent contradiction.

Throughout this book, in every part where drugs or diseases are [illegible] the writer has arranged the titles in alphabetical order, [illegible] their English names. This has been done because it is [illegible] the reader a ready-reference book to which he may [illegible] for desired information, for at present the state [illegible] so unsettled that a true classification is impossible. [illegible] may be classed by one writer as a nervous sedative, [illegible]-producer, by a third as a bitter substance, and [illegible] respiratory depressant. Bromide of potassium can with equal propriety be called a spinal sedative or a cerebral sedative, or caffeine be classed as a cerebral stimulant, a circulatory stimulant. or a diuretic.

In order to make the book more complete, the preparations of the British Pharmacopœia have been introduced; and with the same object in view, a dose-list of drugs, both official and unofficial, has been appended for ready reference. The subject of medical electricity has heretofore commonly found a place in most text-books on therapeutics, but has been advisedly omitted in this instance, since electrical therapeutics has outgrown any work save one devoted to that subject alone.

For many of the articles on treatment the author wishes to thank friends who have earned prominence in connection with their specialties. Thus Dr. G. E. de Schweinitz has contributed the articles on the treatment of diseases of the eye; Dr. Edward Martin, those on the treatment of venereal diseases and on antisepsis; Dr. Barton C. Hirst, those on the treatment of diseases of the puerperal state: and Dr. J. Howard Reeves, the articles on the treatment of diseases of the upper air-passages. All of these articles enhance the value of the book to so great an extent that the author feels sure they will be sought out and read with interest.

In addition to the general index, a copious and explanatory index of diseases and remedies has been appended, which will prove suggestive and valuable to practitioners, and for which the author is indebted to his friend and student, Mr. J. G. Clark.

PHILADELPHIA, 222 SOUTH FIFTEENTH STREET.
SEPT., 1890.

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PART I.

GENERAL THERAPEUTICAL CONSIDERATIONS.

Before entering into a study of the action of drugs upon a living body, it is necessary that the student should possess a clear idea of what the word "therapeutics" means, the reason why we resort to drugs, and, more important than all, that he should grasp the limitations which govern the administration of remedies.

Two very foolish and unfounded ideas have recently been put forward by certain physicians—one being, that medical therapeutics is useless; and the other, that this branch of medical knowledge is not advancing with so great a stride as is pathology or surgery. The individuals who laugh at the general use of drugs in disease belong to one of two classes: either they have never tried them, or if so have used the drugs ignorantly or wrongly, or else they believe that they are promulgating a new theory, and do not know that the eras of excessive dosage and of nihilism are alike relics of the past. No reform has ever attacked a crying evil without becoming excessive and absurd itself, and if successful in accomplishing its object has generally resulted not in the mere remedy of the faults it antagonized, but in so complete a reversal of popular opinion as to force its converts into ways as reprehensible as their former habits. Thus, in exactly the same manner that the excesses of Catholicism resulted in fanatical Puritanism so did the careless methods of physicians during the past century lay the foundation for the growth of homœopathy or therapeutic nihilism. At the present time, although we have much to learn, it can be said that we have benefited by both of these errors, and are in consequence taking a path which may be considered the happy medium.

To the majority of the readers of this book, however, the harmfulness of over-dosing is sufficiently evident, and the cry of "no drugs at all" so absurd that no rebuttal need be offered.

The statement that therapeutics is to-day more backward than are pathology and surgery is readily answered by a denial; for the therapeutist is able to treat successfully many diseases of which the pathologist knows nothing, and is obliged to rest his treatment on empiricism simply because he cannot tell how his drugs act if the pathologist cannot tell him what the disease is. Rheumatism is a good example of this very point.

In regard to surgery, every one must recognize the extraordinary advances made in this branch of medical science, yet comparatively few realize that it is solely by the introduction of drugs that all its triumphs are posssble. The definition of the word "therapeutics" in Billings's *Dictionary* is: "That branch of medical science which treats of the application of remedies to the cure or alleviation of disease," and, practically, the term is almost universally used to signify the employment of drugs for such purposes. The credit for the introduction of new instruments may or may not be accorded to surgery, but the discovery of new drugs must be accorded to therapeutics. We find, then, that ether and chloroform began to revolutionize surgery fifty years ago, and that corrosive sublimate, carbolic acid, and other drugs have revolutionized it once more within the lifetime of every one who reads this book. Cocaine has changed the entire aspect of eye surgery and other minor operations, and has immediately averted an enormous amount of pain and suffering which the surgeon could not relieve, and certainly could not remove, in the absence of its influence. To the accusation of backwardness the therapeutist can well reply by asking the champion of any other branch of medical science to put forward one discovery which equals antipyrine or acetanilide in power to relieve disease or pain, or which can be applied as specifics to so wide a scope of ailments.

In the language of one of the most progressive medical men of to-day in the United States, the man who does not believe in the proper use of drugs for the cure of disease must lack the very keystone of the arch upon which all medical knowledge rests.

The ultimate aim and object of all medical thought and effort is the cure or alleviation of disease, and therapeutics is the refined product culled from every department of medical learning. Like every other thing requiring a thorough knowledge of its component parts, it is often much abused by the careless and ignorant, but is a power for good in the trained hand of the properly educated physician.

Further than this, therapeutics is the only universally used branch of medicine, for each and every branch must resort to it, and the most skilful operator who fails to treat his cases medicinally with equal skill will have worse results than he who, though bungling in his surgery, yet uses drugs intelligently after his slashing is finished.

Homœopathy depends upon more than one reason for its existence. If infinitesimal doses are given, the patient is satisfied that he is receiving medicine, and Nature often produces her most rapid cures when left alone. Again, the entire basis of homœopathic therapeutics rests not upon the study of the causes of diseases, but upon the symptoms which constantly present themselves. As a result of this, so many minor symptoms are relieved that the patient's comfort is ensured, and doubtless in many instances serious disorders are discovered which might otherwise be cast aside or go unseen. No detail should be too small to attract the attention of the physician, and he who exercises care in detail must reap reward in larger measure.

MODES OF ACTION OF DRUGS.

Drugs act in two ways, which are sometimes called near and remote, direct and indirect. The near, or direct, action of a drug is that influence which is felt by the exercise of its effects directly upon the tissues with which it comes in contact; the indirect, or remote, influence is that result which comes as a sequence of its primary effect. As an illustration of this we may take the local use of cantharides. The local, near, or direct effect of this is a blister; the remote or indirect effect is the absorption of exudations or the influencing of inflammatory processes. If pilocarpine is used, its direct effect is the sweating which ensues, while its indirect effect is the relief of dropsy through the removal of exudation by the increased action of the skin, salivary glands, and kidneys.

MODES OF ADMINISTERING DRUGS.

Drugs may be administered for the purpose of affecting the general system in many ways, but practically we employ only six methods, as follows:

1. By the mouth or stomach;
2. By hypodermic injection;
3. By inhalation;
4. By the rectum;
5. By inunction;
6. By the endermic method.

By far the most usual manner of administering drugs is by way of the *mouth*, which is the most natural means of entrance into the body for foreign substances. Whenever medicines are used in this way, the physician should clearly bear in mind what the medicine is to do after it is swallowed. Thus, if the drug is intended to act directly upon the stomach, it should not be given after meals, but some time before, since the food and gastric juice may afterward so cover the gastric mucous membrane that the medicament cannot act. Thus, in the case of chronic gastric catarrh or gastric ulcer, the nitrate of silver which is used should always be given half an hour or an hour before meals. On the other hand, if an ulcer or other trouble exist in the small intestine, the pill should be given some time after meals, and, if a heavy meal is taken, three or four hours after, since under these circumstances the medicine is swept out into the intestine almost at once, without remaining any time in the stomach, where it may be chemically altered. Very often it is necessary to give a medicine soon after food is taken, in order that it may not act in too powerful or concentrated a manner upon the viscus which receives it.

The general rule, however, may be laid down that all medicines are to be taken after rather than before meals, unless a local gastric effect or very rapid absorption is desired.

Next to the use of drugs by the mouth, by far the most popular method is their administration by means of the *hypodermic needle* and syringe. The logic of this method rests upon the absorption of all soluble substances from the subcutaneous tissues with great rapidity. Any substance soluble enough or suspendable enough to pass through a hypodermic needle without forming an obstruction may be employed, provided it is not too irritating and that it is "clean."

The proper places to give such injections are the forearm on the extensor surface,[1] the calf of the leg, the buttock, or the broad of the back—in other words, any spot where the tissues are not dense and unyielding. The skin of the part is to be grasped or pinched up with the thumb and forefinger of the left hand and the needle sent well into this raised fold, preferably above the finger and thumb, so that the pressure of the fingers may prevent pain and the too rapid entrance of the medicine into the system. The needle should always penetrate well into the loose connective tissue, so that the liquid injected may find lodgment in the loose and spongy subcutaneous tissues without separating the skin from its rather close adhesion to the tissues below or from the blood-vessels supplying it, for if separation occurs abscess and a slough may result.

The dangers from hypodermic injections are chiefly two. First: The medicine may enter a vein, owing to the penetration of its wall by the needle, and the entire dose be carried at once, *en masse*, to the vital centres. Second: The solution used may not be sterile or the needle may be dirty, and an abscess may result. The first danger is to be avoided by injecting into spots not well supplied with veins, and the second by thoroughly washing both syringe and needle with water the instant before they are used, pushing a fine wire through the needle, and in some cases by soaking the latter in carbolized oil. The liquid injected may be rendered sterile by using freshly boiled water and adding thereto carbolic acid in such proportion that one-half to one drop of carbolic acid is present in each injection. It is claimed by some that this use of carbolic acid seriously hinders absorption, and in cases of urgency it should not be used. Most hypodermic syringes hold from twenty to thirty minims.

When drugs are given by the *rectum*, we employ them for three purposes: First, to influence the general system by their absorption; secondly, to act locally upon any disease which may be present in this particular locality or in the colon; and, finally, to dislodge substances or parasites which it is desired to bring away. The word "enema" is loosely used to denote all these injections, be their purpose what they may, and is synonymous with "rectal injection" or the more old-fashioned word "clyster." If nourishment is being given, the injection is called a "nutrient enema." Sometimes these injections are called "lavements."

In this mode of administration it is very necessary that the physician should use his medicaments in proper bulk; and it may be laid down as a rule that no more liquid should be injected than is necessary to convey the medicine or food, unless the injection is for the purpose of emptying the bowel of fæcal matter or other materials, or it be desired to distend the bowel in order to overcome obstruction, or to influence the colon by drugs.

---

[1] Hypodermic injections into the anterior aspect of the forearm often cause much pain in the hand by irritating temporarily the branches of the radial or ulnar nerves.

The reason for this lies in the fact that any large bulk of liquid sent into the rectum so stimulates its walls by distention as to cause spasmodic contraction, with expulsion of all the rectal contents, which is just what is needed when fæcal matter is to be removed, but the opposite of what is desired when retention of a remedy or food is necessary for absorption or local action. In rectal catarrh or ulcer two to four ounces of liquid are usually sufficient in an adult to accomplish any medicinal influence locally or by absorption, while as a laxative enema one to two pints may be employed.

In the use of injections we frequently find that the rectum becomes irritable, and promptly resists all efforts to force the entrance of liquids or solids. This is to be avoided by giving the injection so gently that the bowel fails to recognize, as it were, the entrance of liquid, and by introducing a few drops of oil and laudanum in each injection.

A large amount of distress often follows the gradual accumulation of fæcal masses in the colon which are not passed with the daily movement of the lower bowel. These can readily be removed by large injections of warm water or by the use of medicated liquids.

A very important use of injections by the rectum is in the treatment of the various causes of intestinal obstruction. Here the greatest caution should be exercised that the injection be made with all possible gentleness, and slowly, the liquid being allowed to dribble into the bowel rather than to force its way. It is dangerous to use a greater pressure than is given by a fountain syringe at the height of two or three feet, as rupture of the peritoneal coat of the bowel may occur. Where a large quantity of water is used it should be carefully warmed to 100° or a little more, and it is well to add salt to it, so that it will represent the normal saline strength of blood-serum, namely, seven-tenths of one per cent. (For use of injections in special diseases see Part IV., and for Enteroclysis, Part III.)

Suppositories are another means by which we introduce medicines into the bowel, either for local effect or to act after absorption of their contents upon the general system.

When drugs are given by *inhalation* they are generally employed with the object of affecting the respiratory tract alone, although there are notable exceptions to this in ether, chloroform, nitrous oxide gas, and other volatile substances. Aside from anæsthetics, we find such remedial measures adopted as the inhaling of steam laden with the drugs employed, the respiring of air loaded with the fumes of the medicament, or the inhalation of gases, and last, and most commonly resorted to of all, the use of the atomizing spray, which, if properly made and employed, so minutely divides the liquid containing the medicine that the inspired air carries it to the farthest bronchiole and pulmonary vesicle. Atomized sprays have also been found to possess great penetrating power in the treatment of inflammations under the skin or mucous membranes, as, for example, boils and carbuncles.

As an example of the rules governing the administration of drugs in this manner we find that compound tincture of benzoin may be taken by inhaling the steam arising from hot water containing it, but cannot be used in a spray because it occludes the fine points of the atomizing tubes. In a similar manner we may inhale the smoke of belladonna or tobacco-leaves to relieve asthma, or the fumes of chloride of ammonium for bronchitis in its later stages. Finally, we find that oxygen is sometimes very useful, the gas being readily inhaled, with good results in proper cases.

The "spray" or atomizer is made in two forms—one form of apparatus being worked through the agency of compressed air, the other through the escape of steam from a small boiler. Very few of the compressed-air atomizers throw a spray fine enough to reach the deeper parts of the lung, particularly if the air is compressed by the hand.

The inhalation of moist air is very useful in bronchitis, and greatly aids other remedial measures. Steam may be disengaged in a room by means of a kettle of boiling water or by placing pieces of unslaked lime in a pan of water.

Inunctions consist in the rubbing into the skin of medicines generally of an oily or fatty nature, or which assume this character through embodiment with oil or fat. The three substances most commonly used in this way are cod-liver oil, mercurial ointment, and iodine ointment. They should always be applied on some part where the derm is thin and well supplied with subcutaneous lymphatics, as in the axillæ, the groins, or the insides of the thighs. Other substances have been and may be used by inunction; but as this method is necessarily a disagreeable and dirty one, it is rarely resorted to unless the stomach is disordered or it is necessary to push the drug into the system by every possible avenue of entrance.

The *endermic method* consists in the use of a blister, by means of which the epiderm is raised, when a little morphine or other alkaloid may be slipped under it and so absorbed through the true skin. It is a painful method, almost never to be resorted to, which has been entirely supplanted by the hypodermic method of medication.

Remedies are administered in a number of forms, but chiefly as follows:

ABSTRACTS are dry powdered extracts mixed with sugar of milk until they are twice as strong as the crude drug. Abstracts are no longer official in the United States Pharmacopœia.

ACETA, or vinegars, are solutions of drugs in vinegar or acetic acid. There are two in the United States Pharmacopœia (Acetum Opii and Acetum Scillæ) and three in the British.

ALKALOIDS are organic bases, forming salts with acid radicals, generally occurring in crystalline form and abstracted from crude drugs. They nearly always represent the active principle of the drug.

AQUÆ, or waters, are used as vehicles either for the dilution of strong medicines or for the purpose of carrying minute amounts of flavoring materials.

CATAPLASMS are not official in the United States Pharmacopœia, but are in the British Pharmacopœia. They are virtually poultices made of linseed-meal or of bread-crumbs.

CERATES are ointments containing wax to render them harder than would ordinary fats.

CHARTÆ, or papers, consist of bibulous paper soaked in a solution of the drug which they are meant to carry.

CONFECTIONS are sometimes called electuaries or conserves, and are soft pastes which contain the drug mixed with sugar or honey.

DECOCTIONS are solutions of drugs made by boiling and then straining while hot.

ELIXIRS are diluted tinctures rendered pleasant to the taste by the addition of aromatic substances and sugar.

EMPLASTRA, or plasters, are made up of adhesive substances placed upon a backing of cloth or leather and designed to adhere to the skin, being so applied for the purpose of holding a medicinal substance in contact with the body, of acting as a protective, or of aiding in the approximation of the edges of a wound.

EXTRACTS consist of the soluble parts of plants reduced to a semisolid or solid condition by evaporation; the soluble constituents being taken from the plant by water or alcohol.

FLUID EXTRACTS are made in the same way as solid extracts, except that they are not so completely evaporated.

GLYCERITA, or glycerins, are solutions of various substances in glycerin—the glycerin being used as a vehicle.

INFUSIONS are made by pouring boiling water on the crude drug and allowing it to stand for a short time until the water cools, after which the liquid is strained. Sometimes cold water is employed.

PILLS are small round masses which, as a general rule, should not weigh more than three grains, in order to avoid their being too bulky. If the material is a heavy one, as much as five grains may be placed in each pill. Pills may be uncovered or coated with sugar or gelatin. If the pill is fresh and the sugar pure, they are useful. Many pills are fraudulently coated with varnish and are insoluble.

SUPPOSITORIES are small masses made into a cone shape and having for their basis cacao butter. They are designed to carry into the rectum certain medicines for absorption into the system or for local action.

TABLETS.—Under this name manufacturing pharmacists and others prepare compressed pills or lozenges, generally of small size, the mass being made to adhere by means of its being subjected to great pressure by special machinery. Smaller tablets are used for carrying powerful drugs for hypodermic use. These, however, are often only lightly pressed, so as to render them easily soluble.

TINCTURES are solutions of the active principles of drugs in alcohol.

TRITURATES are made by adding 10 per cent. of the active medicine to 90 per cent. of milk-sugar. These are then carefully rubbed together until the two are intimately mixed, and are very valuable in the administration of medicines to adults or to children.

TROCHES, or lozenges, are flat, hardened masses designed for holding medicines in the mouth, so that they may be slowly dissolved, thereby affecting the local mucous membrane

OINTMENTS, or unguents, consist of the mixture of some kind of fatty substance with the medicine which they are designed to carry.

WINES are made in the same way as tinctures—strong white wine being used in the United States, and sherry or orange wine in Great Britain, in place of ordinary alcohol.

DOSAGE.

There is, unfortunately, no absolutely fixed rule which can be applied to dosage, for several reasons. In the first place, the individual may not be readily affected by drugs, or the disease-process which is present may so antagonize them as to render very large doses necessary. Further than this, the age and sex of a patient have much to do with the regulation of the proper amount of a drug which we may give. Finally, that curious but common condition of susceptibility to various remedies, that we call *idiosyncrasy*, creeps in as an important factor in the decision as to the dose which should be given in each case. By far the nearest approach which we can make to absolute accuracy in dosage is to use drugs *according to the weight of the patient*, but this method possesses the disadvantages that we cannot always weigh our patients, and that the presence of a large amount of fat or of dropsy will make an unknown quantity in our calculation as to the true weight of the active part of the individual.

At present we are accustomed to be governed by a list of doses to be given to all adults within certain limitations, and which are varied sufficiently to permit of great differences in the effects obtained. It is in this very point that the success of many a physician chiefly rests; for the use of a dose by "rule of thumb" is as empirical and lacking in thought as is use of a remedy, not because we have a definite action for it to carry out, but because it did some one else good who was suffering from what appears to have been a similar attack. The dose must be varied to fit the case in the same manner that the cut of a coat must be varied to fit each individual.

There are a number of approximate rules in regard to the doses which are to be given in treating the diseases of children, the best of which is Young's rule. This is as follows:

Add 12 to the age and divide by the age. Thus, if a child is two years old, we have the following formula: $2 + 12 = 14 \div 2 = 7$, or, one-seventh of the dose for an adult is the dose for a child of two years. This rule is not a law, however, for of narcotics children should receive less than this (one-half), and of purgatives or laxatives more than this (two or three times).

Closely connected with the question of dosage is that of how drugs shall be ordered; that is, whether we shall employ the apothecaries' weights or the metric system of weights and measures. There is no doubt that the latter are far preferable from a scientific point of view, and they are generally used in all civilized countries save England and America. Even here, however, their use is daily increasing. Whether we use the old or the new system, however, we should always take pains when ordering small amounts of liquids to write for minims rather than drops, for the size of a drop varies with the particular liquid with which we are dealing and the character of the mouth of the vessel containing it. This is well shown in the following table, compiled by Kinsey and originally published in the *American Journal of Pharmacy:*

	Dropped from				Dropped from		
	Shop bottle.	Glass stopper.	Minim measure.		Shop bottle.	Glass stopper.	Minim measure.
Acetum lobeliæ	51	48	64	Oleum tanacetti	110	91	136
Acetum opii	66	57	65	Oleum terebinthinæ	103	90	142
Acetum sanguinariæ	102	92	92	Spiritus ammon. ar.	108	87	139
Acid. acetic.	82	49	101	Spiritus camphoræ	98	79	140
Acid. acetic. dilute	94	55	99	Spiritus æther. comp.	120	88	140
Acid. carbolic.	82	66	110	Spiritus æther. nitr.	88	86	141
Acid. hydrobromic.	57	65	70	Spiritus menthæ pip.	98	86	143
Acid. hydrochloric.	60	57	96	Syrupus scillæ comp.	106	87	122
Acid. hydrochloric. dil.	70	51	62	Tinctura aconiti	120	102	164
Acid. nitric.	82	66	124	Tinctura asafœtidæ	102	85	145
Acid. nitric. dilute	63	60	81	Tinctura belladonnæ	94	81	128
Acid. nitrohydrochloric.	87	74	92	Tinctura benzoini co.	98	81	146
				Tinctura cannabis ind.	124	120	98
Acid. nitrohydrochloric. dilute	58	54	62	Tinctura cantharidis	118	97	136
Acid. phosphoric.	54	43	62	Tinctura capsici	116	88	143
Acid. sulphuric.	160	152	172	Tinctura colchici	86	80	124
Acid. sulphuric. dilute	57	47	60	Tinctura digitalis	114	79	145
Acid. sulphuric. aromatic.	97	94	144	Tinctura ferri chlor.	108	. .	139
Aqua ammoniæ	45	41	54	Tinctura hyoscyami	114	91	147
Aqua destillata	64	. .	61	Tinctura ignatiæ	112	83	140
Liquor potass. arsen.	58	61	77	Tinctura iodi	112	97	144
Oleum anisi	76	73	112	Tinctura kino	116	100	148
Oleum amygdalæ amar.	102	77	75	Tinctura krameriæ	117	96	150
Oleum cari	108	84	133	Tinctura lavand. co.	97	86	141
Oleum chenopodii	94	75	129	Tinctura lobeliæ	110	79	138
Oleum carophylli	98	75	133	Tinctura myrrhæ	100	95	145
Oleum cinnamomi	77	73	112	Tinctura nucis vomicæ	112	105	148
Oleum crotonis	84	62	104	Tinctura opii	98	92	143
Oleum cubebæ	86	80	120	Tinctura opii camph.	94	86	135
Oleum gaultheriæ	93	93	136	Tinctura opii deodor.	109	89	141
Oleum hedeomæ	95	83	130	Tinctura rhei	98	82	144
Oleum lavandulæ	105	78	133	Tinctura sanguinariæ	110	88	134
Oleum monardæ	82	76	125	Tinctura stramonii	100	93	120
Oleum menthæ pip.	88	73	132	Tinctura tolutani	120	97	156
Oleum menthæ viridis	95	81	132	Tinctura veratri virid.	108	98	152
Oleum myristicæ	98	83	128	Vinum aloes	71	54	94
Oleum origani	91	83	133	Vinum colchici rad.	92	72	95
Oleum pimentæ	102	86	133	Vinum colchici sem.	86	71	105
Oleum rosmarini	92	88	133	Vinum ergotæ	148	99	122
Oleum sassafras	83	77	142	Vinum opii	96	72	102

When drugs are given hypodermically the dose should be generally one-half to one-quarter of that given by the mouth, and if any thought of idiosyncrasy exist, the dose should be smaller still at the start if powerful remedies are to be used.

By the rectum the dose should be twice the amount given by the mouth, unless the drug be very powerful or capable of very rapid absorption.

IDIOSYNCRASY.

This is one of the most interesting features of the study of the action of drugs. It is a frequent cause of disappointment to both patient and doctor, and an equally frequent cause of excessive action from what the physician has thought to be a moderate dose. No rule can be laid down for the discovery of idiosyncrasy in a given case, except that females, particularly of the hysterical type, are more subject to it than are males, although certain men often present marked evidences of this tendency. No better illustration of idiosyncrasy can be adduced than the case which here follows, nor than that of a friend of the author who cannot eat a strawberry without suffering from a violent attack of hives.

The first case is that of a woman of thirty years, suffering from severe headache, who received an eighth of a grain of the hydrochlorate of pilocarpine, hypodermically, every twenty minutes, until nearly three-fourths of a grain was taken, without any evidence of its action either in salivary flow or sweat. But the tolerance of drugs did not stop here. Twenty drops of tincture of cannabis indica every four hours failing to relieve the pain, half-grain pills of the solid extract were ordered, two of which commonly affect a grown man most markedly. The extract had been proved to be active to other patients. In order to avoid any failure in absorption the pills were each cut in half before they were given, and forthwith administered, one every three hours, without any effect after ten had been taken. Twenty more of the pills from the same manufacturers, but from a different retailer, were now given, one every hour with the exception of a few irregularities in administration during the night, the entire twenty being swallowed between four o'clock one afternoon and two o'clock in the next afternoon. The thirty pills (fifteen grains) were taken in less than forty-eight hours without producing a single physiological sign of the slightest character. That the doses were really swallowed would seem to be undoubted, for their administration was carried out by a trained attendant, and their black color forbade their expulsion from the mouth on the bed without attracting attention. The hypodermic injections were given by the author, and, as the solution was used as fast as it was made, the patient must certainly have received all of the pilocarpine.

As there was daily an afternoon rise of temperature amounting to several degrees, quinine bisulphate was ordered in the dose of fifteen grains, to be given after six powders of one-sixth of a grain of calomel had been taken; this not only failed to control the fever, but also produced no buzzing in the ears. The writer was now inclined to consider all the symptoms as hysterical, even including the evening rise of temperature.

Twenty-four hours after the last dose of cannabis indica the attendant gave the patient, without orders, no less than sixty grains of antipyrin in sixteen hours without any physiological symptoms, and, under orders, she took from forty to fifty grains of bisulphate of quinine every day for three days without any signs of cinchonism.

Wide experience has taught us, however, that several conditions act fairly constantly in regard to some idiosyncrasies. Certain diseased conditions—such as peritonitis or pain—allow large doses of opium to be given, and in lead-poisoning and paralysis patients may require enormous doses of active purgatives to move the bowels.

The *climate* in which the patient lives, or has been accustomed to live, renders him more or less susceptible to certain remedies. Thus the East Indian runs amuck after eating hasheesh or cannabis indica, or the Chinaman goes into a delightful dreamland from smoking opium, whereas the Anglo-Saxon experiences no such agreeable sensations, as a general rule. Southerners generally require larger doses of purgatives than Northerners, often because their livers are not as active.

The *temperament* of an individual is also a highly important matter to be considered. It is a notorious fact that phlegmatic dark-skinned persons usually yield to drugs less readily than blonds and nervous persons, more especially in respect to the drugs which act on the nervous system. Nervous light-haired women stand belladonna very badly as a general rule, while children will take large doses often without discomfort. Opium is usually badly borne by children.

Habit is another important factor governing idiosyncrasy. We all know how rapidly one becomes accustomed to tobacco, and how morphine *habitués* take enormous amounts of their favorite drug without effect.

ABSORPTION OF DRUGS.

The knowledge of the rapidity with which certain drugs are absorbed from the various surfaces with which they come in contact is of importance in order that we may know when to repeat the dose if the first amount does not produce the desired effect. The rapidity of absorption depends upon a number of factors. If the circulation is active, absorption is active, but if it be depressed, absorption is slow. Thus, in a person apparently drowned, absorption may not occur at all until the vital functions are restored, and repeated doses given to the patient while unconscious, acting together, in the end poison him. This is often the case in delirium tremens where hypodermic injections of morphine are given or when the drug is administered by the mouth. In dropsy absorption is peculiarly slow, and the drug may remain in the tissues for days, only to be absorbed with the exudation after severe purgation or profuse diuresis, or tapping. In general dropsies hypodermic medication is nearly always worse than useless.

When the stomach or bowel is empty absorption from either is rapid, but when they are full it is very slow. In this fact we find the reason for the popular idea that a glass of whiskey when a man is hungry makes him drunk, whereas twice the quantity after dinner does not do so.

Drugs in the stomach or bowel have no influence over the general system unless they are irritants. They only act when taken into the blood or lymphatics.

Recent studies show that alcoholic solutions of drugs are more rapidly absorbed than are watery solutions or those made with glycerin or milk.

When the stomach is depressed and its powers of absorption impaired, the addition of some irritant or stimulant, such as capsicum, will often aid in the absorption of an important drug.

DURATION OF ACTION OF DRUGS.

The duration of the action of drugs depends partly upon their rapidity of absorption, but chiefly upon the rapidity or slowness of their destruction in the body or their elimination from it. Thus, volatile substances, such as ether, chloroform, and nitrite of amyl, act only for a short time and are quickly eliminated, whereas bromide of potassium and digitalis continue active during many hours, and are slowly eliminated, as in the case of the former, or oxidized, as in that of the latter. Again, if curare is given hypodermically it will cause paralysis, but if taken by the stomach in moderate amount it will be eliminated by the kidneys as rapidly as it is absorbed, and produce no effects if these organs are active.

From studying the rapidity of the elimination of a drug we learn how often to order a dose. Thus, digitalis may be given once, twice, or thrice a day, but carbonate of ammonium every two or three hours.

When the physician is not careful in the use of a drug which is eliminated slowly, it may suddenly develop so severe an effect as to cause alarm, owing to the accumulation of the poison in the body. This is called "cumulative action."

STRENGTH AND RELIABILITY OF DRUGS.

If a census could be made of those who die annually from the use of drugs which are impure or useless from weakness, the writer believes that a most alarming array of figures would be presented. For many years this was unavoidable to a great degree, either because our knowledge of the active principles of drugs and the methods of isolating them was deficient, or because the time consumed in their transportation by sailing vessels or on the backs of natives from the countries in which the natural products yielding the drugs were obtained, permitted deterioration to take place. At present these difficulties have been largely overcome. The trained pharmacist is taught how to make an essay for active principles in most of the valuable alkaloidal drugs, and every physician should make careful investigation into the quality of all preparations which he employs. That these remarks are not out of place will be seen by the fact that very recently an intimate friend of the writer bought from five of the leading druggists of Philadelphia six ounces of tincture of nux vomica which were stated to have been made according to the directions of the United States Pharmacopœia. That made by perhaps the leading druggist of the five contained twice as much strychnine and brucine as it should, and had twice as much solid residue; or, in other words, a physician prescribing this tincture in full dose would probably have poisoned his patient and reported the case as one of unusual susceptibility to drugs! On the other hand, the author has recently seen a tincture of nux vomica which contained only a trace of alkaloid, but had much inert solid residue. In neither instance was the druggist a dishonest one intentionally, but one had used a crude drug which was unusually rich in alkaloids, while the other had purchased nux vomica beans which, by reason of immaturity, bad surroundings, or exposure to weather, were very poor in active principles. All these disadvantages may be avoided if physicians will insist that the druggists who dispense the drugs they order shall either themselves prepare assayed products, or purchase such products from any one of the large manufacturing chemists who put assayed goods on the market. When this is impossible, the physician should employ the alkaloids in pill form, or, if solutions are desirable, the alkaloid may be added to alcohol and water and given by drops, as is the case with any ordinary tincture. Digitalis and veratrum viride are practically the only drugs with which this cannot be done; in the first the action of the drug does not depend upon a single active principle, but upon a large number, and in the second the relative proportions of jervine and veratroidine cannot be well estimated by the physician. H. C. Wood records a case in which opium poisoning occurred in a child who had taken a Dover's powder; the reason being that the amount of opium intended for many doses was in the powder that was dispensed, the other constituents not having been properly mixed with the opiate in compounding the prescription. Constant uncertainty is a dangerous element when we are dealing with patients who are desperately ill; and in many cases failure and discouragement may both be avoided if the physician will see to it that the tools with which he works are in good order and capable of doing what he requires of them. A poor drug to the physician is worse than a rusty knife to the surgeon; for the injury in the one case is unknown, whilst in the other it can be carefully watched and guarded.

INDICATIONS AND CONTRAINDICATIONS AND DEFINITIONS.

The indication for a drug is any symptom or series of symptoms which we know the drug will relieve without causing at the same time an evil effect to be felt by other parts of the body. A contraindication is any coexisting state or tendency which will be made so much worse by the drug as to forbid its use. Thus, one might be tempted to give quinine in meningitis for the fever, yet this would be bad therapeutics, since quinine is contraindicated because it will intensify the meningitis.

Abortifacients form a class of drugs which, as such, ought never to be employed. If pregnancy is to be interrupted, the interruption should be produced by instrumental means, and then only after consultation.

Alteratives are indicated where cell-growth is active to excess, but contraindicated where tissue break-down is present, or there exists a tendency thereto.

Anæsthetics are drugs used to produce lack of sensation. They are either local or general. Many of the local anæsthetics produce loss of sensation through benumbing the parts by the cold they produce. Cocaine is an example of a local anæsthetic which causes anæsthesia by a direct paralyzant action on the peripheral sensory nerves.

Anaphrodisiacs are remedies used to diminish sexual desire.

Antacids are employed in cases of gastric fermentation when, as a result of the morbid processes, lactic and butyric acids, or even hydrochloric acid, are found in abnormal quantities.

Anthelmintics are those remedies which are used for the purpose of removing intestinal worms.

Antiarthritics is the name given those drugs which are employed for the purpose of relieving inflammations occurring in joints, whether these be in an acute or chronic condition of disease. Colchicum, which is one of this classs, is contraindicated, as a rule, in cases of gouty inflammations of the joints if the bowels are already moving too freely, as, under these circumstances, retrocedent gout is apt to occur.

Antihydrotics are used to prevent excessive sweating, either when it is local or general. Camphoric acid is probably the best general antihydrotic.

Antiperiodics is a term applied to drugs or remedies employed for the prevention or cure of malarial poisoning. They are so named because they tend to break up the periodicity of the attacks, which periodicity is a characteristic of such diseases.

Antiphlogistics are remedies employed to prevent the progress of inflammatory processes. They are nearly all contraindicated in the presence of tissues possessing an impaired vitality through previous conditions of disease.

Aphrodisiacs are remedies used to increase sexual desire and power.

Astringents are employed for the purpose of contracting or constringing tissues. They act not by coagulation of albumin, but by their influence over the vital processes of the tissues with which they come in contact. Theoretically, all astringents should be non-irritating, but practically they possess irritant properties, and are, in consequence, contraindicated in the presence of very acute inflammations as a rule. Three of the mineral astringents, however, possess marked sedative properties in addition to their astringent power, and can therefore be used freely in acute inflammations when locally applied. They are nitrate of silver, subacetate or acetate of lead, and the subcarbonate or subnitrate of bismuth.

Bitters are remedies designed to increase the activity of the mucous membrane of the gastro-intestinal canal by increasing its tone. They may be divided into simple bitters and complex bitters. The first depend upon their bitterness solely for their activity; the second class is well represented by quinine or strychnine, both of which are exceedingly bitter, but, in addition to their local effect on the gastro-intestinal mucous membrane, act as stimulants to other portions of the organism. A good example of a simple bitter is columbo. Many bitters contain so much tannic acid that they are not generally useful, and for this reason very few can be used with preparations of iron, since a tannate of iron would be formed.

Cardiac sedatives are drugs which decrease the force of the heart, and, as a class, the amount of blood expelled at each beat of the ventricles. They are indicated in arterial excitement, contraindicated in arterial depression.

Cardiac stimulants are drugs which increase the force of the heart, thereby increasing the quantity of blood expelled from the ventricles. This may be accomplished by an increase in the rapidity of the beats or by a greater output of blood at each contraction, the diastole being sufficiently prolonged to admit of the ventricles being well filled. They are contraindicated in the presence of arterial excitement, and indicated in arterial depression.

Carminatives are remedies given for the purpose of expelling flatus, particularly if there is reason to believe that the "wind" has accumulated because of intestinal torpidity. Many of the carminatives are necessarily possessed of irritant properties, and are therefore contraindicated in the presence of flatulence due to intestinal atony arising from inflammation. The best carminative is spiritus ætheris compositus, or Hoffmann's Anodyne.

Cathartics.—These are drugs employed when a positive and decided action of the bowels is desired. They occupy a position between the purges and the drastics. (See Purges and Drastics.) The best example of a cathartic is probably jalap.

Cholagogues are used when it is desired to exert a stimulant influence over the flow of bile, without necessarily increasing intestinal peristalsis. Nitro-hydrochloric acid is, perhaps, the best type of a pure cholagogue, while podophyllum represents the class of cholagogues which increase intestinal peristalsis in addition. Cholagogues are contraindicated in the presence of acute inflammation of the gall-bladder or liver.

Counter-irritants are remedies used to produce irritation at a spot distant from a painful or inflamed area, in order to relieve the diseased parts by reflex action exerted through the nervous system upon the painful nerve or disordered capillary network.

Demulcents are substances used to protect any exposed parts of the body from irritation.

Diaphoretics produce an increased secretion from the sweat-glands. They may be considered as internal and external. The internal are represented by pilocarpine, which stimulates the sweat-glands themselves; the external are represented by the Turkish and Russian baths, which, by increasing bodily heat, cause a profuse sweat by reflex action.

Diuretics are used to increase the flow of urine from the kidneys. They act by stimulating the renal epithelium to greater activity, thereby increasing the excretion of both the watery and solid constituents of the urine; or they simply increase the watery constituents by increased blood-pressure in the kidney.

It is to be remembered that the vegetable salts of potassium and the lithium salts increase the solids in the urine, not by stimulating the secreting epithelium of the kidney, but by uniting with insoluble material in the system, forming soluble compounds which are then readily eliminated. (See Eliminators.) They are indicated in conditions of renal inactivity due either to functional or organic causes. Irritating diuretics, such as cantharides, for example, are contraindicated in acute nephritis. Such a diuretic is only to be used where the kidneys are inactive through atony or prolonged chronic or subacute disease.

Eliminators are drugs which, by forming soluble compounds with insoluble substances in the body, render them capable of being excreted by the excretory organs, such as the skin, kidneys, and bowels.

Emetics are drugs used to produce vomiting. They act centrally when, as is the case with apomorphine, they stimulate the vomiting centre, peripherally when they irritate the walls of the stomach. They are indicated when we wish to unload the stomach of undesirable materials, or when we desire to cause an increased flow of bile from the gall-bladder, which is accomplished by the pressure exerted upon this viscus when the abdominal walls and diaphragm contract in retching. When the ducts are mechanically obstructed by a gall-stone emetics are dangerous, as they may cause rupture of the gall-bladder.

Sometimes we are able by the use of emetics to rid the lungs and stomach of mucus in bronchitis or gastric catarrh.

The contraindications to emetics are cerebral congestion or meningitis, gastritis, gastric ulcer, advanced pregnancy, and hernia.

Emmenagogues are remedies used to produce or increase the menstrual flow. They are of two classes—direct and indirect. The direct are all of them irritants, and are seldom of much value; the indirect are used to overcome the morbid condition underlying the menstrual disorder, and are therefore more rational. Thus iron and arsenic may be used in amenorrhœa due to anæmia with beneficial result.

Expectorants are employed when it is desirable to promote secretion or to get rid of secretion in the bronchial tubes. Thus, in the early stages of an acute bronchitis the mucous membrane is hyperæmic and swollen, but dry and irritable. Ipecac and citrate of potassium form at this time a sedative expectorant mixture, which, while allaying irritation, promotes secretion, and so relieves the engorged area.

On the other hand, after the acute stage is passed, there may be so much atony of the mucous glands that the secretion is either too scanty or too viscid to be coughed up. Stimulant expectorants, such as chloride of ammonium, eucalyptus, and terebene, are now to be employed. These latter drugs are contraindicated in the acute inflammatory stage of the disease, as they would simply stimulate the irritated mucous membrane to greater irritation.

Hypnotics are drugs used to produce sleep. They may be divided into those which produce sleep and relieve pain, and those which have no analgesic power. The latter are therefore not to be employed in sleeplessness due to pain, and the former are contraindicated when pain is absent. Thus, chloral produces sleep if it be ordinary functional insomnia; but if the sleeplessness is due to pain, opium is the drug to be employed. Chloral, in ordinary doses, is the purest hypnotic that we have.

Mydriatics are drugs which produce dilatation of the pupil or mydriasis. Conditions of the eye associated with increased intraocular tension are contraindications to mydriatics, as a rule.

Myotics are drugs which cause contraction of the pupil or myosis. They are best represented by eserine.

Nervous sedatives are indicated and contraindicated in a reverse manner to nervous stimulants.

Nervous stimulants are contraindicated in nervous excitement, indicated in nervous depression.

Oxytoxics are drugs which increase the expulsive power of the uterine muscular tissues.

Revulsives are remedies used to produce increased activity of the general system or parts thereof through reflex influences—that is, they cause a determination of blood to one part, thereby relieving an engorged area. Thus, in cerebral congestion or effusion a vigorous purgative or cathartic may give relief by exercising a derivative effect. Revulsives are closely allied to counter-irritants.

Roborants are drugs or measures devoted to the repair and building up of tissues in the body, and comprise both foods and drugs. Roborant treatment also includes hygienic surroundings, fresh air, light and healthful employment.

Tonics are used to increase vital activity. They are indicated in instances of local or general systemic depression, contraindicated in cases of inflammation or excitation with excessive functional activity. (See Bitters.)

Vasomotor depressants are drugs which decrease arterial pressure by an action on the vasomotor nervous system rather than by an action on the heart. They act by relaxing the blood-vessels.

Vasomotor stimulants are drugs which increase arterial pressure by an action on the vasomotor system, thereby producing contraction of the blood-vessels.

COMBINATION OF DRUGS FOR JOINT EFFECT.

The study of the physiological action of drugs has aided us very greatly in improving our therapeutic measures. Thus, we now know that chloral is a heart-depressant and cannot be used in very full doses, or pushed to produce sleep in persistent insomnia, without grave danger; whereas morphine, which also produces sleep, but does not depress the heart, but does depress the respiration, can be combined with it, and the two acting together, each in small dose, produce a heavy sleep, although so little chloral is present that the heart is safe, and so small an amount of morphine is used that the respiration does not suffer.

Another example of this is found in certain purgative pills where the purgative agent is assisted by belladonna and nux vomica, the first of which relaxes muscular spasm, while the second acts as a tonic to the alimentary tract, the drugs combining to accomplish one result.

Skill in the combination of drugs, not only for increased physiological effect, but also for the purpose of making their administration pleasant to the taste, has much more to do with professional success than is generally supposed. This is particularly so in regard to children, for parents dislike forcing their children to take doses which they themselves regard as horrible, and they are ever ready to believe that as long as a medicine tastes good it is better than one which tastes otherwise.

The medical practitioner who prescribes ever so wisely and appropriately for a patient, but who is utterly regardless as to his combinations of drugs so far as taste is concerned, will sooner or later see a more ignorant man take from him that practice which his greater wisdom entitles him to, but which is driven from him by his own errors in this matter.

While in some cases there is no alternative but to give a bad dose, in others a little thought and care will often avoid offending the taste of the patient.

INCOMPATIBILITY.

The chief value of a knowledge of chemistry or pharmacy to a practitioner of medicine is the avoidance of what is known as an "incompatibility," or the placing in one prescription of two or more substances which will undergo chemical interchanges, decompositions, precipitations, or cause the formation of explosive mixtures. It is impossible to detail all the incompatibilities, and only the most dangerous and common possibilities of error can be considered:

1st. An acid should never be combined with an alkali.

2d. An acid should not be added in any quantity to a tincture. The following prescription is an illustration of this:

℞. Potassii iodidi . . . . ʒij.
Acidi nitro-muriatici . . . . f℥j.
Tr. cinchonæ comp. . . . . q. s. f℥iij.—M.
S.—Use as directed: a teaspoonful.

In this ridiculous mixture the acid is incompatible with the iodide of potassium, forming a chloride and setting free iodine, and would also change part of the alcohol in the tincture into an ether.

3d. Alkalies should not be combined with the alkaloids. Thus:

℞.—Strychninæ sulph. . . . . gr. j.
Potassii iodidi . . . . ʒij.
Syr. sarsaparillæ comp. . . . . f℥iij.—M.
S.—Teaspoonful t. d.

In this prescription the strychnine would be precipitated by the potassium salt, and the patient would get nearly all the strychnine in the last dose.

4th. Potassium chlorate should not be ordered to be rubbed up with tannic acid or any other organic substance capable of oxidation, as it will explode. Permanganate of potassium is subject to the same rule.

5th. Chlorate of potassium and ammonium chloride when mixed together may take fire.

6th. Iron is incompatible with tannic acid, as it forms a tannate of iron, or ink. As all the vegetable astringents contain tannic acid, they should none of them be used with iron except chiretta and columbo.

7th. Tannic acid should never be added to solutions of alkaloids.

8th. Gum arabic is not to be added to solutions of iron, lead, or the mineral acids.

9th. Alcoholic solutions of camphor and similar resinous substances are incompatible with water.

10th. Fluid extracts are incompatible with water, as the addition of water will precipitate them.

11th. All salts not acid but alkaline in reaction are decomposed by acids.

12th. All salts which are acid are decomposed by alkalies.

13th. All vegetable acid salts are altered by mineral acids and are decomposed by alkalies.

14th. Iodine and the iodides should not be given with alkaloids.

15th. Corrosive sublimate, the salts of lead, iodide of potassium, and nitrate of silver should always be prescribed alone, except in the following instances:

(*a*) Corrosive sublimate may be given with potassium iodide, since it will throw down a precipitate which redissolves and forms a double salt.

(*b*) Nitrate of silver may be used with extract of opium or hyoscyamus.

16th. Syrup of squill should not be given with the carbonate of ammonium, as it contains acetic acid. Chloride of ammonium is not incompatible with it.

17th. Cherry-laurel water should not be prescribed with morphine, as it may form the poisonous cyanide of morphine.

18th. Chloral and cyanide of potassium should never be placed in the same prescription, as they will decompose each other, setting free hydrocyanic acid,

19th. Cocaine and borax when added together form an insoluble borate of cocaine. Boric acid and cocaine do not result in this formation.

20th. Calomel and antipyrin are said to be incompatible, as are also sweet spirit of nitre and antipyrin.

21st. Waters cannot be used in preparing saturated solutions of drugs, as they are already loaded with a volatile substance.

22d. Pepsin and pancreatin should not be used together, since one destroys the other.

CLASSIFICATION OF DRUGS.

In order that the student may gain a definite idea as to the various actions of different remedies the following list of drugs is appended, which is of necessity somewhat arbitrary. The endeavor has been made to place the best or most powerful drug of each class first in the list. It is to be remembered that a strict physiological classification is impossible.

I. ALTERATIVES.

1. Mercury.
2. The iodides of potassium and ~~sodium~~.
3. Iodine.
4. Iodoform.
5. Iodol.
6. Arsenic.
7. Cod-liver oil. = Oleum Morrhuae
8. Colchicum.
9. Ichthyol.
10. Taraxacum.
11. Mezereum.

Potassii Chloras.
Sulphur Praecipitatum

II. ANÆSTHETICS.

1. Ether.
2. Nitrous oxide gas. = Laughing gas
3. Chloroform.
4. Cocaine. = alkaloid of Coca.
5. Bromide of ethyl.
6. Chloride of ethyl. C_2H_5Cl
7. Pental.
8. Bromoform.
9. Eucaine.
10. Carbolic acid.
11. Antipyrin.
12. Menthol.

III. ANTACIDS.

1. Ammonia.
2. Sodium and its salts.
3. Liquor potassa.
4. Calcium and its salts

IV. ANTHELMINTICS.

Those that are used against the round-worm are —

1. Santonica
2. Spigelia.
3. Chenopodium.
4. Azedarach.
5. Santoninate of sodium.

Those used against the tape-worm are—

1. Pelletierine.
2. Aspidium.
3. Pepo.
4. Pomegranate.
5. Brayera.
6. Kamala.
7. Turpentine.
8. Chloroform.

Those used against the seat-worm, or oxyuris vermicularis, are—

1. Quassia.
2. Turpentine.
3. Tannic acid.
4. Chloride of sodium.
5. Vinegar.

V. ANTISEPTICS. (See also Disinfectants.)

1. Corrosive sublimate in weak solutions.
2. Carbolic acid in weak solutions.
3. Peroxide of hydrogen.
4. Boric acid.
5. Sulphate of iron.
6. Permanganate of potassium.

VI. ANTIPERIODICS OR ANTIMALARIALS.

1. Cinchona.
2. Eucalyptus.
3. Warburg's tincture.
4. Arsenic.

VII. ANTIPYRETICS.

1. Antipyrin.
2. Acetanilid or antifebrin.
3. Phenacetin.
4. Guaiacol.
5. Phenocoll.

✓5. Salicylic acid.
-6. Thallin.
-7. Carbolic acid.
-8. Kairin.

VIII. ANTISPASMODICS. for spasms.

1. Chloral.
✓2. Bromides.
-3. Hoffmann's anodyne.
✓4. Camphor.
✓5. Opium.
✓6. Belladonna.
✓7. Asafœtida.
-8. Musk.
✓9. Valerian.
✓10. Monobromate of camphor.
-11. Amber.
-12. Cimicifuga.
-13. Hops.
amyl nitrate.

IX. ASTRINGENTS.

Vegetable:

✓1. Tannic acid.
✓2. Hæmatoxylon.
✓3. Kino.
✓4. Catechu.
✓5. Rhatany or krameria.
6. Rhus glabra.
7. Geranium.
✓8. White oak. = Quercus alba,
9. Black oak.
✓10. Gallic acid.
11. Rosa centifolia.
12. Rosa gallica.

All of these depend chiefly upon tannic acid for their active principle.

Mineral:

1. Sulphuric acid.
2. Alum.
✓3. Lead.
✓4. Nitrate of silver.
5. Nitric acid.
6. Sulphate of copper.
7. Bismuth.
8. Sulphate of zinc.

X. CARDIAC SEDATIVES.

✓1. Aconite.
✓2. Veratrum viride and ~~album~~.
✓3. Antimony. = Antimonii et Potassi Tartras.
-4. Hydrocyanic acid.
-5. Veratrum sabadilla.

XI. CARDIAC STIMULANTS.

1. Digitalis.
2. Ammonia.
3. Ether.
4. Alcohol.
5. Caffeine.
6. Nux vomica.
7. Ignatia.
8. Strophanthus.
9. Adonis vernalis.
10. Convallaria majalis.
11. Sparteine.
12. Amyl nitrite (momentarily).
13. Opium.

XII. COUNTER-IRRITANTS.

Those counter-irritants that blister are called epispastics. They are—

1. Cantharides.
2. Thapsia.
3. Ammonia when under a watch-glass.

Those that redden or produce local hyperæmia of the skin are—

1. Mustard.
2. Capsicum.
3. Turpentine.
4. Ammonia.
5. Chloroform.
6. Burgundy pitch.
7. Canada pitch.
8. Most of the spices.

Under the name of ESCHAROTICS are grouped a number of substances capable of acting as destructive agents upon the soft tissues of the body. They are—

1. Chromic acid.
2. Nitric acid.
3. Sulphuric acid.
4. Nitrate of mercury (solution).
5. Bromine.
6. Caustic potash.
7. Caustic soda.
8. Arsenious acid.
9. Chloride of zinc.
10. Vienna paste.
11. Canquoin's paste.

XIII. DIAPHORETICS.

The only ones that we know as direct stimulants to the glands are—

1. Pilocarpus or jaborandi.
2. Warburg's tincture.

The others are—

3. Hot dry and hot moist baths.
4. Dover's powder.
5. Alcohol (particularly when hot).
6. Nitrous ether.

XIV. DIGESTANTS.

1. Pancreatin.
2. Pepsin.
3. Hydrochloric acid.
4. Papain.
5. Diastase.

XV. DISINFECTANTS.

1. Corrosive sublimate.
2. Chlorine or chlorinated lime.
3. Carbolic acid.
4. Chloride of zinc.

XVI. DIURETICS.

Those that increase both the solids and liquid constituents are probably—

1. Caffeine.
2. Squill.
3. Cantharides.
4. Buchu.
5. Blatta.
6. Juniper.
7. Turpentine.
8. Uva ursi.
9. Chimaphila.
10. Cubebs.
11. Pareira brava.

Those which increase the watery constituents of the urine without increasing the solids proportionately are—

1. Digitalis.
2. Vegetable salts of potassium.
3. Nitrous ether.
4. Lithium.

XVII. ELIMINATIVES.

1. The iodides.
2. The salicylates.
3. The vegetable salts of potassium.
4. The lithium salts.
5. Jaborandi.
6. Colchicum (probably).

XVIII. EMMENAGOGUES.

The direct emmenagogues are—

1. Apiol.
2. Binoxide of manganese.
3. Permanganate of potassium.
4. Cantharides.
5. Aloes.
6. Myrrh.
7. Rue.
8. Savine.
9. Tansy.
10. Pennyroyal.
11. Guaiac.

The indirect are—

1. Iron.
2. Copper.
3. Arsenic.
4. Tonics in general.

XIX. EMETICS.

The direct are represented by—

1. Apomorphine.
2. Ipecac (which is both centric and peripheral).
3. Tartar emetic (which is both peripheral and centric).

The peripheral are—

1. Sulphate of zinc.
2. Mustard.
3. Alum.
4. Sulphate of copper.
5. Turpeth mineral.

XX. EXPECTORANTS.

Sedative:

1. Citrate or acetate of potassium.
✓2. Ipecac.
3. Antimony.

Those which act as stimulating expectorants are—

✓1. Ammonium chloride.
✓2. Apomorphine. Hydrochloras.
3. Creasote.
4. Eucalyptus.
5. Tar.
✓6. Terebene.
7. Oil of sandal-wood.
✓8. Lobelia.
9. Sulphur.
10. Grindelia robusta.
11. Garlic.
✓12. Squill. = Scilla.

Besides these we have nux vomica, which increases expectoration by stimulating the nervous system to coughing, and thus expels the mucus. Opium and the bromides depress the nervous system and allay cough, and so decrease expectoration.

XXI. HYPNOTICS.

1. Chloral.
2. Bromides of potassium, sodium, etc.
3. Opium.
4. Sulphonal.
5. Paraldehyde.
6. Urethan.
7. Somnal.
8. Amylene hydrate.
9. Methylal.
10. Hypnone.
11. Hyoscine, in mania.
12. Cannabis indica (in large dose).

XXII. NERVOUS SEDATIVES.

1. Chloral.
2. Opium (in full doses).
3. The bromides and hydrobromic acid.
4. Chloroform.
5. Amyl nitrite.
6. Nitrites of potassium, sodium, and nitroglycerin.
7. Ether.
8. Bromide of ethyl.
9. Nitrous oxide.
10. Bromoform.
11. Cannabis indica.
12. Belladonna.
13. Antipyrin.
14. Acetanilid.
15. Phenacetin.
16. Calabar bean.
17. Hydrocyanic acid.
18. Lobelia.
19. Conium.

20. Tobacco.
21. Sulphonal.
22. Croton chloral.
23. Paraldehyde.
24. Camphor.
25. Monobromated camphor.
26. Asafœtida.
27. Amber.
28. Hoffmann's anodyne.
29. Cimicifuga.
30. Musk.
31. Valerian.
32. Humulus.
33. Castor.
34. Hypnal.
35. Somnal.
36. Amylene hydrate.
37. Urethan.

XXIII. Nervous Stimulants.

1. Nux vomica.
2. Ignatia.
3. Coffee.
4. Coca.

XXIV. Oxytocics.

1. Ergot.
2. Cotton-root.
3. Ustilago maydis.

And indirect when in labor:

1. Quinine.

Spinants:

XXV. Tonics.

1. Cinchona.
2. Nux vomica.
3. Calumba.
4. Arsenic.
5. Phosphorus.
6. Mercury (in minute doses).
7. Copper.
8. Iron.
9. Hydrochloric acid.
10. Nitro-hydrochloric acid.
11. Nitric acid.
12. Phosphoric acid.
13. The vegetable bitters in general.

XXVI. Vasomotor Depressants.

1. Amyl nitrite.
2. Nitroglycerin and other nitrites.
3. Veratrum viride.
4. Antimony.
5. Aconite.
6. Veratrum album.
7. Veratrum sabadilla.
8. Alcohol (in excessive doses).
9. Jaborandi.

XXVII. Vasomotor Stimulants.

1. Belladonna.
2. Hyoscyamus.
3. Digitalis.
4. Nux vomica.
5. Ergot.
6. Stramonium.
7. Caffeine.
8. Convallaria.

PART II.

DRUGS.

ACACIA.

Acacia, U. S., Acaciæ Gummi, B. P., Gum Arabic or Gum Acacia, is a gummy exudate from the stems and branches of small trees known as *Acacia Senegal*, and other acacias growing in Northern Africa and in Australia. As sold in the stores it consists of irregular semi-transparent lumps, which are either smooth or angular, according to whether the substance has been preserved in the original beads or broken by handling. Its color is slightly yellow or almost white, both color and transparency depending largely on the amount of the impurities by which it is contaminated.

It is devoid of physiological action.

Therapeutics.—Acacia is employed in medicine as a local application to *inflamed* and *irritated mucous membranes*, particularly of the upper air-passages, and also when dissolved in water in the form of a drink when the same conditions exist in the mucous membranes of the alimentary canal and genito-urinary tract. In all these states it is useful as a vehicle for more powerful remedies. Made into a mucilage with flaxseed, to which liquorice may be added, it is largely employed to loosen a hacking *cough* in children or in adults. The flaxseed should not be boiled, but allowed to stand on a moderately warm part of the "range," and the gum-arabic solution added with a little lemon-juice for flavoring purposes. Acacia is chiefly used in pharmacy for making pills, emulsions, and similar preparations, and is official in the form of the mucilage of acacia (*Mucilago Acaciæ, U. S.* and *B. P.*) and the syrup of acacia (*Syrupus Acaciæ, U. S.*), the first containing 340 grms. of acacia and water enough to make 1000 grms., and the second 25 c.c. of the mucilage to 75 c.c. of syrup.

ACETANILID, or ANTIFEBRIN.

Acetanilidum, U. S. and *B. P.*, was first employed in medicine by Cahn and Hepp, and is a white crystalline material only slightly soluble in water, but completely soluble in alcohol and ether. Applied to the tongue, it causes a burning sensation which is very slight. It has been known to chemists for many years, and is made by the action of glacial acetic acid upon aniline, forming acetanilid or phenyl-acetamide. The word *antifebrin* is a registered name, and should be avoided by the profession, since its employment obliges the druggist to use the acetanilid made by one firm instead of the compound made by other chemists, who are able to make the drug as an ordinary chemical compound, and do not charge so high a price as do those holding control over the registered name.

Physiological Action.—Acetanilid has been studied experimentally and clinically to a very great extent, and fairly definite outlines of its action have been mapped out.

NERVOUS SYSTEM.—On the nervous system acetanilid has been found to act as a sedative, the sensory portion of the nerves and spinal cord particularly being quieted. After a poisonous dose general anæsthesia comes on, with total loss of reflex action and with motor and sensory paralysis. The portions of the nervous system involved in these changes are, primarily, the sensory side of the spinal cord and the sensory nerves, the motor apparatus being least affected. The muscles are not influenced by the poison, except indirectly.

CIRCULATION.—On the circulation acetanilid has but little direct influence except when used in poisonous doses. Applied to the frog's heart, it at first accelerates its beat and increases its force, but soon causes a weakening, ending with arrest in wide diastole. Upon the higher animals it causes, in toxic dose, an immediate fall of arterial pressure with a diminution in the size of the pulse-waves and all the evidences of cardiac and circulatory depression, notwithstanding the fact that death ensues from respiratory failure. The cause of this fall of blood-pressure is a direct depressing action on the heart associated with failure of the vasomotor system, as asphyxia causes no rise in pressure.

In medicinal dose acetanilid causes no circulatory changes of any moment. Sometimes the pulse-rate is increased, sometimes diminished. The tendency is, however, toward depression rather than stimulation of the circulation.

BLOOD.—The action of this drug upon the blood, when used in large doses, is more pronounced than its influence upon any part of the body, causing this tissue to become brownish-red, decreasing its ozonizing and oxygen-carrying power, and, finally, reducing the hæmoglobin to methæmoglobin to a very considerable extent. The question as to the influence of acetanilid upon the corpuscles is still somewhat undecided, some observers declaring that these bodies are disorganized, while others assert that they remain intact. In moderately large poisonous doses it may not affect the corpuscles, but if its use in large amount be maintained for some days, or a very large amount be used at one time, corpuscular destruction certainly occurs, free hæmoglobin appearing in the urine in its characteristic forms. The normal alkalinity of the blood is decreased, and the urine becomes dark and brownish in color, so that the blood-crystals of Teichmann may be found in it. In ordinary medicinal doses the blood shows no change except in cases where idiosyncrasy is present or the doses are unusually large. Under these circumstances the blood in the arterial system becomes more blue than normal.

RESPIRATION.—No effect is produced upon this function by acetanilid when given in moderate doses. When poisonous doses are used the breathing at once becomes rapid and then impaired and labored. Large doses produce death by paralysis of the respiratory centres. The causes of these changes are, primarily, the alterations in the blood, which so influence oxygenation of the tissues as to lead the respiratory centres to greater effort, while at the same time they are beginning to be directly depressed by the drug itself, so that impairment of their function is soon manifest. Bokai asserts that the drug paralyzes the peripheral motor nerves, which, if true, brings forward a third factor in the respiratory failure.

TEMPERATURE.—When given in full medicinal doses, acetanilid lowers the normal bodily temperature or else fails to produce any change. In poisonous doses it produces a decrease in temperature depending on the amount employed, and may produce collapse and rigors. On a fevered temperature it acts as a powerful and fairly constant antipyretic, lowering the fever by *decreasing heat-production* and *increasing heat-dissipation*, heat-production being the function most affected.[1] Whether the decrease in heat-production is due to an action on the heat-centres in the nervous system, or upon other causes, is not positively known. Some investigators have claimed that the fall depends upon the partial reduction of the hæmoglobin of the blood, whereby less oxygen is carried to the tissues and less combustion ensues. This seems doubtful, in view of the fact that the most careful spectroscopic examination of the blood fails to show any such change from the use of medicinal doses. That the fall of temperature is not dependent on the sweat produced is proved by the fact that the temperature falls even if enough atropine be given to stop all perspiration.

KIDNEYS, TISSUE-WASTE, AND URINE.—Much contradictory evidence exists in regard to the changes which occur in these organs and their excretory products under the influence of acetanilid, but most observers agree that the excretion of urea is increased, and it is a fact that the more laborious researches which have been undertaken have reached a similar result (Lepine, Chittenden, and Taylor). Less uncertainty exists as to its influence on the elimination of uric acid, which is increased rather than diminished by the drug. After excessively large doses the urine becomes dark from the presence of broken-down blood-coloring matter.

ELIMINATION.—The drug is eliminated by the kidneys in the form of para-amido-phenol-sulphate.

Antiseptic Action.—The drug possesses antiseptic powers, but they are only exercised when the amount present is quite large. (See Therapeutics.)

Toxic Changes from Prolonged Use.—Although it has been claimed that no untoward effects result from the prolonged use of acetanilid in large doses, there can be no doubt that this is untrue. Under these circumstances congestion of the liver, kidneys, and spleen occurs, and if the dose be poisonous, clots may be found in the cardiac cavities.

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[1] The conclusions of Evans and of the writer have been severely criticised by H. C. Wood. My reasons for holding to the opinions stated can be found in my Boylston Prize Essay of Harvard University on Antipyretics, Philadelphia, 1891.

There may be also a progressive decrease in the number of the red blood-corpuscles.

Poisoning.—In man this drug in toxic quantity causes the lips to become blue, the face livid, cyanosed, expressionless, or anxious. The forehead and cheeks become covered by beads of sweat, which gradually extend over the rest of the body. The pulse is soft and compressible, but slow, and finally very weak. The respirations become slow and shallow. Poisoning has occurred rarely from its external use.

The treatment of a case of poisoning by acetanilid should consist in supporting measures, the use of stimulants, external heat, belladonna to maintain blood-pressure, strychnine to aid the respiration, and oxygen inhalations if they are necessary to combat cyanosis.

Therapeutics.—The employment of acetanilid in fevers must depend very much upon the exact condition of the patient and the form of his disease. The mere existence of a malady, or of a high temperature, cannot, correctly speaking, be an indication for any particular remedy. The phase of the disease must be recognized, and the question as to whether the fever which is present is harmful must be duly weighed. (See Treatment of Fever, Part IV.)

In *typhoid fever* the studies of most clinicians show that though the drug possesses very decided antipyretic power, it often causes great depression and collapse, and in no way influences the duration or general course of the disease.

For the same reasons the value of acetanilid in *phthisis* is doubtful, since, although it greatly affects the temperature, it is very apt to cause collapse, profuse sweating, and depression. Thus the writer has repeatedly seen cases of phthisis in which the attempt to control the fever resulted in the manner just stated, and Riese points out, what the author has also noted—namely, that in this disease cyanosis is very apt to come on after the use of the drug.

In regard to the employment of acetanilid in *sthenic fevers*, it at once becomes evident that a drug absolutely unsuited to a case of asthenic disease may, on the other hand, agree with a sthenic-fever patient very well. In consequence of this, we find that the sweating produced by acetanilid is not so marked or troublesome in diseases of a dynamic type, and that, in consequence, it more rarely causes collapse; but even in this class of cases, and particularly in both varieties of pneumonia, the use of acetanilid is rarely advisable. Indeed the antipyretic use of this and similar compounds is yearly becoming less if cold can be used in their stead.

In much the same manner that antipyrin was found, some time after its introduction, to be possessed of pain-relieving power, so acetanilid has been discovered to possess similar properties—a discovery the credit of which must be given to the French investigator Lepine. Almost every form of nerve-pain seems to indicate its employment. It has been successfuly used in the crises of *ataxia*, the agonizing dartings of *gastralgia*, in cases of *sciatica*, and severe *headaches* often yield to its influence. A large amount of experience has proved it to be of value in *epilepsy*.

The employment of acetanilid in acute *rheumatism* may be separated, if desired, into that devoted to the cure of the disease, with the relief of pain and the reduction of pyrexia. There can be no doubt whatever of the ability of the drug to control the fever of this disease. and the question as to whether it favorably influences the severity of the malady is to be answered very forcibly in the affirmative. (See Rheumatism, Part IV.) The dose for cases of *rheumatism* should be 4 (0.2) to 6 grains (0.5) three times a day. In subacute rheumatism of the muscular type acetanilid will often give great relief.

Acetanilid is of great value in the treatment of *chancroids* when used in dry powder, and it is useful in the antiseptic dressing of wounds.

In many cases of *obstinate vomiting*, particularly that following surgical operations when an anæsthetic has been used, acetanilid is a useful drug. The drug is usually best given in the dose of 1 grain every half hour until 6 grains are taken; and the following prescription may be used in compressed tablet, pill, or powder, preferably the latter, in order to increase the sedative effect on the stomach and steady the heart:

℞.—Acetanilidi	gr. vj.
Caffein. citrat.	gr. iij.
Camphor. monobromati	gr. vj.—M.

Ft. in pil. vel chart. No. vi.

S.—Wash down with a little water or else dissolve powder in a drachm of brandy; pour over cracked ice, and give it from a spoon.

Acetanilid has even been recommended when applied locally as a hæmostatic in *epistaxis*, and has been given internally with asserted advantage in *hæmoptysis*.

Acetanilid very distinctly increases the susceptibility of a patient to cold, and for this reason it should not be used for the relief of neuralgic or other pain before leaving the house in cold weather if it can be avoided.

Untoward effects are not very common if acetanilid be used with care. The writer has collected a number of cases (thirty-eight) in which unfavorable signs appeared after its use, but untoward action was never seen unless the dose given was excessive for the case which received it. The dose most commonly producing such symptoms was from 3 (0.15) to 10 grains (0.65). In only three instances of the series did death occur—one from heart-clot and two from *excessive* dosage. No deaths were reported from moderate amounts, although some of the cases were very alarming. Very rarely symptoms of poisoning by acetanilid, such as are described on p. 44, follow its now general use as a dusting powder over wounds and other breaks in the skin.

Administration.—Acetanilid may be given in doses varying from 2 (0.1) to 10 grains (0.65), the last-named amount being usually far too much. As it is virtually insoluble in water, it should always be administered in wine or spirit, in which it will dissolve, or in capsules or pills. The antipyretic effect begins to be felt about one hour after the drug is taken. When neuralgias are to be treated or similar forms of pain are present, monobromated camphor, in the dose of ½ a grain, may be combined with acetanilid with advantage.

℞.—Acetanilidi . . . . gr. xx (1.3).
Camphor. monobromati . . . . gr. v (0.3.)—M.
Ft. in pil. No. x.
S.—One every two hours.

This pill is not to be used if there is reason to believe that marked renal congestion or irritation is present.

ACETATE OF POTASSIUM.

Potassii Acetas, U. S. and *B. P.*, is a neutral white salt of saline taste, readily deliquescent and soluble in water. It was at one time very largely used in the treatment of *rheumatism* in the "alkaline method," as when it enters the blood it is changed into an alkaline carbonate. It has, however, been supplanted by the salicylates in the treatment of most cases of rheumatism. The dose should be from 1 to 2 ounces (32.0–64.0) a day. A combination of 10 grains (0.65) of the iodide of potassium and 30 grains (2.0) of the acetate is useful in *rheumatism* in some instances.

In *hepatic torpor* acetate of potassium is exceedingly useful, and aids in promoting the flow of bile as well as that of the urine. It has been used in the treatment of the *uric-acid diathesis*, and acts powerfully in rendering an acid urine alkaline. At one time it was supposed to purify the blood by aiding in the oxidation of effete material. The dose of *potassii acetas* is from 20 grains to 2 ounces (1.3–64.0), but the latter dose is only employed when a purgative effect is desired.

ACETIC ACID.

Acidum Aceticum, U. S. and *B. P.*, as used in medicine, is a clear liquid made up of 36 per cent. of acetic acid and 64 per cent. of water, and has a sweetish odor. It is obtained from wood by destructive distillation.

Acetum, or Vinegar, is practically a dilute acetic acid.

Therapeutics.—Acetic acid is seldom used internally, except in combination with potassium or sodium. As a powerful escharotic the glacial or absolute acetic acid (*Acidum Aceticum Glaciale, U. S.* and *B. P.*) is used. It can be applied to *warts* and other growths, and to old *sores* where the granulations are profuse and slow to heal. The dilute acid (*Acidum Aceticum Dilutum, U. S.* and *B. P.*) is used as a lotion in *night-sweats* and to arrest *epistaxis* and other small hæmorrhages. As a lotion to be widely employed it should be diluted one-half. Vinegar, or dilute acetic acid, has been used internally for the decrease of *obesity*, but is a harmful and useless remedy, disordering digestion and reducing the patient's strength.

In the following mixture acetic acid has been used with success for the removal of vegetations about the external genitals:

℞.—Acid. salicylic. . . . . gr. xxx (2.0).
Acid. acetic. . . . . f℥j (32.0).—M.
S.—Apply with a camel's-hair brush.

Very little pain is caused by this application.

Poisoning.—When over-doses of acetic acid are taken the treatment consists in the use of large doses of milk, alkaline liquids, such as lime-water, soap-water, etc., and the general measures adopted for the treatment of gastro-enteritis. (See Gastro-enteritis, Part IV.)

CONTRAINDICATIONS.—Nursing mothers should not take freely of vinegar, as it may produce a troublesome diarrhœa in the nursling.

ACONITE, or MONKSHOOD.

The aconite of the *U. S. P.* is derived entirely from the tuberous root of *Aconitum Napellus.* At one time the leaves were official, but are so no longer, and for this reason the term "radix" is not to be employed, as it is a useless distinction.

Aconite is indigenous in Germany, France, and Switzerland, and is cultivated as a garden-plant all over Europe and America. The root is so strikingly like that of horseradish as to be readily confused with that article of food, but does not emit the pungent fumes of the latter when it is scraped or broken. It is to be remembered, however, that it produces a distinct feeling of heat in the mouth when chewed. The active principle upon which the therapeutical value of aconite would appear to depend is aconitine, but there is reasonable doubt whether this can be relied upon as completely as the preparations of the crude drug: the aconitine of commerce, moreover, varies very much in strength, because some of it is amorphous and impure, while other samples are very pure and crystalline. Further than this, even the crystalline form is exceedingly variable. In addition to aconitine, Dunstan asserts that there are two amorphous alkaloids—namely, aconine and napelline—and this investigator believes that there is a fourth alkaloid closely allied to napelline.

Physiological Action.—When aconite is placed on the tongue it produces a sensation of tingling and burning which extends over the pharyngeal surface and into the stomach if the drug is swallowed. This is due to its primary irritant and secondary benumbing action on the sensory nerve-endings of the mucous membrane. It sometimes causes a sensation of constriction in the fauces. Aconite is rapidly absorbed and destroyed by oxidation or eliminated.

NERVOUS SYSTEM.—In full medicinal dose aconite depresses the functional activity of the perceptive centres in the brain, the sensory side of the spinal cord, but chiefly depresses the peripheral ends of the sensory nerves. Applied to a mucous membrane, it acts as a local anæsthetic, but is too irritating for this use in the eye. On the motor portion of the body it exerts little influence unless given in large, poisonous doses, when it paralyzes the motor tract of the spinal cord and the peripheral motor nerves.

CIRCULATORY SYSTEM.—When aconite is given in moderate medicinal dose it exercises no marked change on any part of the organism save the circulation, which becomes somewhat slower by stimulation of the vagus centres and by the drug acting as a sedative to the heart-muscle itself. The arterial pressure is slightly decreased by these doses, chiefly by the decrease in cardiac force. If large doses are used, the pulse becomes still more feeble and slow, and the arterial pressure falls from depression of the vaso-motor centre. When a poisonous dose is given it causes first a very marked fall in pulse-rate and arterial pressure, preceded sometimes by a quickening due to a condition of weakness and abortive cardiac action: this condition gradually passes into diastolic arrest of the heart, the viscus becoming paralyzed and refusing to respond to stimuli.

RESPIRATION.—In moderate doses aconite quiets the respiratory movements slightly, particularly if the breathing is hurried before its use. In poisonous doses it paralyzes the respiratory centres, and so causes death.

TEMPERATURE.—Aconite acts as a distinct reducer of fever, probably because of increased heat-radiation arising from relaxation of the capillaries and impaired circulation.

KIDNEYS.—In fever aconite usually increases the urinary flow.

DURATION OF ACTION.—The effect of aconite when given in a large medicinal dose lasts for about three hours.

Poisoning.—When aconite is taken internally in excessive amount it causes tingling of the mucous membranes wherever it touches them, which sensation finally amounts to severe burning. This soon passes away, and is followed by a sense of tingling about the lips and finger-tips or all over the skin. At the same time the patient feels relaxed; the pulse at first becomes weak and slow, but later on rapid and running, so that it seems a mere trickle under the finger; sweating more or less marked is present, and fainting may ensue. Vomiting may occur, but is rare. The respirations now become slow and shallow, seeming to expand the lung to the smallest possible extent consistent with life. The face is pallid and anxious. Consciousness is preserved unless lost through an attack of syncope. There may be exophthalmus, or the eyes may be sunken and dull. The sclerotic coat of the eye is pale and pearly-looking. There is excessive pallor. Clonic convulsions of unknown origin sometimes occur. There may be marked anæsthesia of the skin. The pupils may be normal, contracted, or dilated to a wide degree. The temperature of the body is very low. Death may be gradual or sudden, the slightest movement of the body which can throw any strain on the heart stopping that organ in diastole.

TREATMENT OF POISONING.—The patient is to be placed in a prone position on a bed or board, with the feet higher than the head, in order to confine the circulation as far as possible to the vital centres at the base of the brain. Hot bottles or bricks are to be placed about the body for the purpose of maintaining the bodily heat. Emetics are not to be given if the symptoms are severe, as vomiting may cause cardiac failure, owing to the muscular effort involved, or the stomach may be so depressed that the emetics will not act. If vomiting comes on, it should be into a towel, the patient not being allowed to raise his head. The stomach is to be washed out by means of a stomach-pump or a siphon made of rubber tubing. Ether may be given hypodermically, and followed by alcohol, and this again by digitalis. The ether acts at once, and lasts while the alcohol is being absorbed, and the alcohol supports the heart until the digitalis, which is the physiological antagonist of aconite, but slow and prolonged in its effects, asserts itself. Atropine, because of its stimulating effect on the vaso-motor system, may also be used. If the breathing fails, artificial respiration is to be employed, or if the heart seems about to cease its action, a whiff of the nitrite of amyl may start it going again, but only a few drops of the nitrite should be used, as large amounts depress this organ. Full hypodermic doses of strychnine, such as $\frac{1}{20}$ to $\frac{1}{10}$ (0.003–0.006) of a grain, may be given to stimulate the respiration and heart.

Untoward Effects.—Aconite may cause in susceptible persons a vesicular, or even a pustular, eruption, or instead intense itching of the skin may be developed.

Therapeutics.—The employment of aconite in disease is one of the most universally recognized procedures in medicine. It fulfils indications which nothing else can, and lends itself to the control of a large number of morbid processes, its effects being uniformly explainable by its known physiological action. It is used chiefly for its influence as a cardiac and circulatory sedative, for its effects on the peripheral sensory nervous system, as in the *vomiting of pregnancy*, and in those states in which, through inflammation elsewhere, the nervous system needs a sedative which will simultaneously reduce arterial tension. In the early stages of all *acute inflammations* aconite is of service. It may be applied locally over superficial nerves in *neuralgia* in the form of an ointment (2 grains [0.1] to 1 drachm [4.0], or as the oleate of aconitine, 2 grains [0.1] of the oleate to 100 [6.0] of sweet oil). In the earlier stages of *gonorrhœa* aconite in small doses frequently repeated is a most valuable remedy, and later in the disease tends to prevent *chordee* by its influence on the nervous centres. It is useful in *croup*, *quinsy*, *sore throat*, *severe colds*, *bronchitis*, and *asthma* due to exposure, in their early stages. When *suppression of menstruation* follows an exposure to cold, this drug, given with a hot drink and a hot sitz bath, will often restore the normal flow. In *pericarditis* it is valuable to allay the inflammation and quiet the excited heart, and it is also of great value in the earliest stages of *sthenic pneumonia* if great arterial excitement is present. Aconite is by far the best circulatory and nervous sedative for children suffering from sthenic fevers, particularly of the irritative type. It ought not to be used in adynamic, asthenic affections. Aconite is useless and harmful in prolonged acute diseases, such as scarlet fever, if constantly employed.

In persons who suffer from *asthma* which is preceded by coryza aconite does good if given in the earliest stages.

In nervous *palpitation of the heart* and in the palpitation of *excessive cardiac hypertrophy* aconite is very valuable. In many cases of this character where there is not only hypertrophy, but irregular innervation, the use of a prescription containing aconite and digitalis proves of service, for the minute doses of digitalis stimulate the vagus nerves, and the aconite not only steadies the heart, but also counteracts the stimulant effect of the digitalis on the heart muscle:

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℞.—Tinc. aconit. . . . . fʒss (2.0).
Tinc. digital. . . . . fʒss (2.0).
Tinc. belladonnæ . . . . fʒj (4.0).
Tinc. gentian. comp. . . . . q. s. ad f℥iij (90.0).—M.
S.—Teaspoonful every six hours.

In the *epistaxis* of full-blooded people aconite often affords great relief.

Full doses of Duquesnel's crystalline aconitine are of value in some cases of *obstinate neuralgia.*

Administration.—As a general rule, small divided doses of the drug in the form of the tincture, $\frac{1}{4}$ to $\frac{1}{2}$ a drop (0.015–0.03) given every fifteen minutes, will act better than a full dose given at once, unless the condition of the patient requires very active treatment.

Preparations.—Tincture of aconite (*Tinctura Aconiti, U. S.* and *B. P.*) is used in the dose of 1 to 5 drops (0.06–0.3) in water, repeated every hour if needed so often. A very useful way of employing it is in the form of tablet triturates. The extract of aconite (*Extractum Aconiti, U. S.*) is given in the dose of $\frac{1}{4}$ to $\frac{3}{4}$ of a grain (0.015–0.045), while of the abstract (which is no longer official) 1 grain (0.05) is used. The fluid extract (*Extractum Aconiti Fluidum, U. S.*) is given in the dose of 1 to 2 minims (0.05–0.1). Fleming's tincture ought never to be used. The active principle aconitine is not official in the *U. S. P.* Its dose is $\frac{1}{200}$ to $\frac{1}{100}$ of a grain (0.0003–0.0006), but it ought never to be used internally. The *B. P.* preparations that are not official in the *U. S. P.* are: aconite-leaves (*Aconiti Folia*), aconitine (*Aconitina*), aconite ointment (*Unguentum Aconitinæ*), and aconite liniment (*Linimentum Aconiti*). The dose of the extract of aconite (*Extractum Aconiti, B. P.*) is $\frac{1}{2}$ to 1 grain (0.03–0.06).

ADONIS VERNALIS.

From *Adonis vernalis*, a plant indigenous in Europe and Asia, is derived a glucoside, Adonidin. When given to one of the mammalia —the dog, for instance—it causes an increase in heart-force and a rise of arterial pressure. In the frog poisonous amounts arrest the heart in diastole.

The indications for the use of adonis are all conditions of cardiac failure, particularly the presence of cardiac dropsy. It is much inferior to digitalis and caffeine, but may be employed when these fail, as it sometimes succeeds under such circumstances. Within the last few years adonis vernalis and bromides have been combined in the treatment of *epilepsy* with asserted success.

The dose of adonidin is $\frac{1}{8}$ to $\frac{1}{4}$ of a grain (0.008–0.016) three times a day; or 4 to 8 parts of the plant—all portions of which are employed —may be added to 180 parts of water, and of this infusion a tablespoonful (16.0) may be given every four hours.

AGARICIN.

Agaric, or Touchwood, or Punk, has been used in the Southern United States very largely in the dose of 5 grains (0.3) every few hours in the treatment of the *night-sweats* of phthisis; and *agaricin*, the alcoholic extract of the drug, has been used with very extraordinary results, under these circumstances, by certain German and English physicians, in the dose of from 1 to 2 grains (0.05–0.1) every five hours. Its physiological action is unknown, but it is supposed to act upon the nerve-filaments in the sweat-glands. The writer has employed it frequently in varying dose, and has never seen any decrease whatever produced by it in the sweats of phthisis, although he has watched it most closely, expecting to see great relief follow its use. Sometimes agaricin causes nausea and diarrhœa.

ALCOHOL.

Ethyl Alcohol (*Alcohol Ethylicum, B. P.*) is the only alcohol used in medicine. Some of the other alcohols are exceedingly poisonous. Amylic alcohol is fusel oil.

Alcohol is a liquid derived from the fermentation of starches or sugars in the presence of heat. It is official in four forms—namely, as *Alcohol, U. S.*, containing 91 per cent. by weight of the spirit and 9 per cent. of water; *Alcohol Absolutum, U. S.*, containing not more than 1 per cent. by weight of water; *Alcohol Deodoratum*, containing 92.5 per cent. by weight of alcohol; and *Alcohol Dilutum, U. S.*, or dilute alcohol, 41 per cent. by weight spirit and the remainder water. The drug is generally given in the form of whiskey or brandy, and when the word alcohol is used in the saying, "Give the patient alcohol," one of these two liquids is always meant unless it is otherwise stated.

Physiological Action.—NERVOUS SYSTEM.—Alcohol acts first as a powerful excitant, and afterward, when given in very full dose, as a most active depressant and paralyzant of the nervous system. Locally applied in small amounts to the peripheral nerves, it excites them at first and paralyses them afterward. By the primary stimulation of the brain it increases the rapidity, but not the depth, of thought, and it increases the reflex activity of the spinal cord, the muscles, and the nerves. In large doses it produces lack of co-ordination by depression of the brain and lower nervous system, the loss of co-ordination being due largely to impairment of sensation, so that the power of touch and the muscle sense is interfered with. This makes a drunken man fail to recognize the angles or uneven surfaces of surrounding objects, and the impaired mental power and disordered judgment, combined with the badly-acting motor and sensory pathways, cause him to stumble and fall.

CIRCULATORY SYSTEM.—When alcohol is ingested, either by man or the lower animals, it stimulates the heart-muscle and increases the rapidity as well as the force of its beat. According to Dogiel, the increase in rate is partly due to stimulation of the accelerator nerves, but Castillo denies any such influence. Wood teaches that the effect of alcohol is not through any action upon these nerves, but upon the heart itself, and is probably correct in his belief. Along with the stimulation of the heart a rise of arterial pressure ensues, largely due to increased heart action and partly to vasomotor stimulation. In very large toxic doses alcohol depresses and finally paralyzes the heart and vasomotor system as well as the nervous system.

RESPIRATION.—Respiration is stimulated by small doses of alcohol and decreased by large ones.

TEMPERATURE.—Alcohol at no time increases to any extent the actual number of heat-units in the body. It produces a sensation of warmth, and warms the extremities by causing the heart to pump hot blood from the centre of the body to the cold parts. If it be used in excess, the temperature rapidly falls, owing primarily to the increase of heat-radiation produced by the excessive distribution of heat just named, and secondarily by the depression of vital power, which is caused by a too rapid destruction of the tissues of the body in the effort induced by the drug. Calorimetrical studies show that, while more heat may be created under its influence, so much heat is dissipated that the temperature nevertheless falls.

BODILY METABOLISM.—The quantity of carbonic acid given off by the body under the use of alcohol is in most instances increased, but it may be decreased. The effect on the absorption of oxygen is not known. Some observers have noted an increase, some a decrease, of such absorption, and some no change at all when alcohol is taken. Upon the giving off of nitrogenous substances it acts as a decided depressant, which seems to prove that it inhibits rapid tissue-changes and is a conservator of vital power. It adds force, but not tissue, to the body.

ELIMINATION.—Alcohol is largely "burnt up" in the body, but when taken in excess of the body's oxidizing power it is eliminated by the breath and by the skin, kidneys, and intestines.

DIGESTION.—Alcohol added in any amount to food in a test-tube containing digestive ferments retards or inhibits digestion, but in the stomach, on the other hand, when used in moderation, it assists the process; for by reason of its irritant and stimulating properties it induces the secretion of an excess of the digestive juice. When excessive amounts are ingested it disorders digestion by inhibiting the action of the digestive ferments.

Therapeutics.—The employment of alcohol in disease can here be only briefly alluded to, special mention of its indications being named when the diseases in which it is used are discussed. (See Part IV.) Its chief uses are as a rapidly-acting stimulant in all forms of *cardiac failure* due to shock or to poisons, and as a systemic support and stimulant in low fevers and prolonged wasting diseases, in old age, and in convalescence from acute disease. In both croupous and catarrhal pneumonia alcohol is useful, and particularly is this true when these affections occur in children. (See Pneumonia, Part IV.)

Some additional conditions, to state them specifically, in which alcohol is indicated are *fainting*, *snake-bite*, *surgical shock*, and *chronic* *pneumonia* in its later stages, and *excessive wasting* due to prolonged suppuration. It is also useful in poisoning by depressant drugs, such as aconite or antimony.

Alcohol should never be given in the presence of circulatory excitement, but whenever the circulation fails during the progress of an acute disease it is useful. In the pneumonia of children, whether it be croupous or catarrhal, brandy or whiskey is very useful in the dose of 5 to 60 drops (0.3–4.0) every two hours in a little water or milk. (See Administration.) In exhausting fevers, such as *typhoid* or *typhus*, alcohol finds its true usefulness. While it is well to give alcohol in many cases of enteric fever from the beginning to the end of the attack, for the double purpose of aiding digestion and of supporting the system, its administration should not be a mere matter of routine, but should be based upon clear ideas of the indications it is calculated to fulfil. If the pulse is weak and the patient seems to be sinking, or the appetite is failing and adynamia is a pressing symptom, alcohol is indicated; but if the pulse is good, and the passage of the patient through his illness is not a stormy one, alcohol should be excluded from the sick-room. Sometimes ordinary whiskey or brandy will in severe typhoid fever disorder the stomach. The physician should then employ an old brandy or wine which has acquired an aroma which is called a "*bouquet.*"

In *persistent vomiting* small doses of good brandy poured on cracked ice will often do much good.

Alcohol is not only of service internally, but it is also useful externally as a wash or evaporating lotion over *bruises*, *inflamed joints*, and *wounds* of a contused character. It acts as a cooling and antiseptic dressing. It is also useful for washing the skin of invalids, and "salt and whiskey" applied by rubbing is a good mixture to stimulate the skin of unhealthy persons.

Acute Poisoning.—In advanced poisoning by alcohol, with coma and total relaxation, external heat and hypodermic injections of digitalis and strychnine are indicated if the heart or respiration seems to be failing. Belladonna should be administered to stimulate the vasomotor system if the skin is relaxed and clammy, and counter-irritation to the back of the neck is to be employed if any brain symptoms are pressing. The after-treatment consists in the use of substances stimulating to the stomach, such as ammonia, spirit of Mindererus, and spices, unless there is gastric inflammation, when emollient substances should be used to quiet the irritation. If persistent vomiting comes on, it must be quieted by the patient swallowing pieces of ice, by aconite, cocaine, or minute doses of ipecac. Counter-irritation should be applied over the belly. If the emunctories are not acting freely, thorough purgation by jalap or elaterium (40 grains (2.8) of jalap powder or $\frac{1}{8}$ of a grain (0.01) of elaterium should be employed); or full doses of calomel followed by a saline may be given if milder effects are sought. For the *morning vomiting* of drunkards Fowler's solution of arsenic is often a valuable remedy.

In view of the frequency with which alcoholic and opium poisoning are confused, the following table is appended, which will be found of value in making a differential diagnosis as to the condition of the patient:

Alcoholism and Opium Poisoning.

Alcoholism.	*Opium Poisoning.*
1. Pupils normal or dilated.	1. Pupils contracted.
2. Respiration nearly normal. Pulse rapid, and finally feeble.	2. Respiration and pulse slow and full.
3. Face may be pallid.	3. Face suffused and cyanosed.
4. Skin cool, perhaps moist.	4. Skin warmer than in alcoholic poisoning.
5. Pulse rapid, at first strong, then weak.	5. Pulse slow, strong, and full till late in poisoning.

There is scarcely any difference as to consciousness in the two conditions.

In medico-legal cases the urine should be saved in hermetically sealed vessels for examination.

Acute Alcoholism and Apoplexy.

Alcoholism.	*Apoplexy.*
1. Pulse rapid, compressible, and weak.	1. Pulse apt to be strong and slow.
2. Skin moist, or relaxed and cool.	2. Skin hot or dry.
3. Bodily temperature lowered.	3. Bodily temperature raised.
4. Pupils equally contracted or dilated; generally dilated.	4. Pupils unequal.
5. No hemiplegia.	5. Hemiplegia: one side tossed, the other remaining motionless.
6. Breathing not so stertorous nor so one-sided in lips.	6. Respiration stertorous, the lips being inflated on one side on expiration.
7. No facial palsy.	7. Facial palsy.
8. Unconsciousness may not be complete.	8. Unconsciousness complete.

The smell of alcohol in the breath is no guide, as acute alcoholism may have caused the rupture of a cerebral blood-vessel.

Chronic Poisoning, or the Alcohol Habit.—Chronic poisoning by alcohol results in very characteristic changes in the tissues. As the liver receives the alcohol from the stomach diluted only by the portal blood, it is often affected very early, and cirrhosis of this organ comes on with its accompanying gastric and nutritional symptoms. Mental disturbances are common, and neuritis may develop in its painful forms or produce paralysis or symptoms resembling locomotor ataxia.[1] The treatment of chronic alcoholic poisoning may be carried out in two ways: First, by the isolation of the patient and the complete withdrawal of the drug at once; secondly, by a better plan, a gradual tapering-off in the daily amount of the spirit. In either instance isolation must be absolute, and all smuggling of alcohol to or by the patient prevented. The attendants must be absolutely trustworthy. Careful scrutiny of bedclothes and closets will often be rewarded by finding hidden whiskey-bottles. The depression of the patient when recovering from alcoholism must be met by the use of nutritious broths, highly seasoned in order to stimulate the stomach, by easily digested or predigested foods, and by small doses of morphine or coca if the patient be very weak and need such a stimulus. Koumyss is an exceedingly valuable and nutritious preparation under these circumstances.

In the treatment of the *atonic stomach of drunkards* nothing does so well as the following pill:

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[1] See author's work on *Diagnosis*, Lea Brothers & Co., 1896.

℞.—Oleoresin. capsici . . . . ♏x (0.65).
Olei caryophylli . . . . ♏x (0.65).
Hydrarg. chlor. mit. . . . . gr. xx (1.3).
Aloe Socotrinæ . . . . gr. xl (2.65).—M.
Ft. in pil. No. xx.
S.—One three times a day after or before meals.

If this pill fails to move the bowels, a saline purgative should be used. The following are the principal points in the differential diagnosis of

Chronic Alcoholism and the General Paralysis of the Insane.

Alcoholism.	*Paretic Dementia.*
1. Attacks shorter, and more widely separated by intervals of sanity.	1. Attacks more prolonged.
2. Delirium may be of any character.	2. Delirium of grandeur more marked and defined.
3. Visions more characteristic, and are evil.	3. Visions often not evil, but pleasant.
4. Tremors confined to head and arms.	4. Tremors more diffused.
5. Tremors removed by dose of alcohol.	5. Tremors made worse by alcohol.
6. Mental symptoms temporarily removed, or at any rate improved, by alcohol.	6. Mental state made worse by alcohol.
7. Tremors occur chiefly in the morning.	7. Tremors not confined to the morning.

There is danger of pneumonia from failure of the right side of the heart in subacute and chronic alcoholism, and the physician should always be on the lookout for this complication.

Administration.—Brandy and whiskey are generally used as rapidly-acting stimulants. They should be exhibited in the form best adapted to the work they are intended to perform. If the action must be instantaneous, as in a case of fainting, they should be employed *hot* and *concentrated*, so that the stomach has not to warm the liquid before absorption. They are to be used hypodermically if still more rapid action is required. If administered to aid digestion and support the system, then they should always be *given with the food*—never alone, and never concentrated. They may be given as milk-punch or as eggnog, the latter being the "heavier" of the two so far as digestion is concerned. In fevers of a typhoid type the dose of whiskey or brandy should be for an adult from 1 to 4 tablespoonfuls every three or four hours. More than a pint in twenty-four hours is rarely required, but this amount often does great good and is not excessive. When brandy or whiskey is given to children, the following rules as to dosage may be used as indicating the approximate proper dose: 5 to 10 drops every four hours for a child of 1 month old; 10 to 20 drops for a child of 2 months old; 20 to 30 drops for a child of 3 months old; 30 to 40 drops for a child over 3 months old; 60 drops for a child over 4 months old. In some cases, however, it is well to use half these doses every two hours. In all cases the liquor should be diluted with hot or cool water. Wine-whey is very light and useful. Mulled wine and champagne are particularly useful in the treatment of irritable stomach. (See Foods for the Sick.) Champagne when used as a medicinal stimulant should always be as devoid of sugar as possible —that is, what is known as "extra dry." Gin is rarely employed as a stimulant, except when the kidneys are torpid. Stout and porter are of value in wasting diseases, in convalescence from acute diseases, and for nursing women.

Contraindications.—All states of cerebral excitement, unless due to exhaustion, acute inflammations, the alcoholic habit, apoplexy, meningitis, acute nephritis, aneurysm, and advanced atheroma, contraindicate the use of alcohol, as does also the history of the alcoholic habit.

The official preparations of alcohol are as follows:

Whiskey (*Spiritus Frumenti, U. S.*) should be at least three years old, and be made, in America, from rye for medicinal purposes.

Brandy (*Spiritus Vini Gallici, U. S.* and *B. P.*) is obtained by the distillation of fermented grapes or fruits, and should be from three to five years old before use.

Cologne-water (*Spiritus Odoratus*) is used solely as a lotion and perfume.

Red Wine (*Vinum Rubrum, U. S.*) is made from grapes not deprived of their skins. White Wine (*Vinum Album,*) is the fermented juice of grapes the skins of which have been removed.

Dilute Alcohol (*Alcohol Dilutum, U. S.*), deodorized alcohol (*Alcohol Deodoratum, U. S.*), pure alcohol (*Alcohol, U. S.*), and absolute alcohol (*Alcohol Absolutum*) are also official.

The unofficial preparations are:

Rum, which is made from the fermentation of molasses, and contains about 40 to 45 per cent. of alcohol.

Gin is made from rye or barley, with the addition of juniper-berries and hops. (Good gin and the *Spiritus Juniperi Compositus* of the *U. S. Pharmacopœia* are virtually identical therapeutically.) When diuresis is required and atony of the kidneys is present, without inflammation, gin is a useful medicament, provided that a stimulant is indicated. Gin is one of the alcoholic drinks most apt to produce cirrhosis of the liver.

Port Wine (*Vinum Portense*) is a fermented wine, to which pure spirit is added to increase its strength. It is one of the strongest table wines, and is useful as a stimulant in convalescence.

Sherry (*Vinum Xericum*) has about 30 per cent. of alcohol in it. It is not official in the *U. S. P.*

Beer is made by a slow fermentation, while ale is made by a more rapid fermentation at a higher heat. Most of the beer in America contains about 4–6 per cent. of alcohol.

Porter resembles the other malt liquors closely, except that it contains more solids, due to a scorching of the grain by a high heat.

The *B. P.* preparations that are not official in the *U. S. P.* are rectified spirit (*Spiritus Rectificatus*), proof spirit (*Spiritus Tenuior*), sherry (*Vinum Xericum*), amylic alcohol (*Alcohol Amylicum*), and *Mistura Spiritus Vini Gallici,* which is a useful, pleasant, and nutritious stimulant made by beating up the yoks of two eggs with half an ounce of sugar, and then adding four ounces each of brandy and cinnamon-water. This is sometimes called "egg-flip."

ALLIUM.

Garlic, or *Allium Sativum, U. S.*, is a stimulant to digestion, owing to the volatile oil it contains, which by its somewhat irritating properties excites the gastric mucous membrane to increased secretion. In *persistent colds*, where the bronchial tubes are particularly affected, a garlic poultice, made by pounding the bulbs in a mortar, is a very efficient though disagreeable remedy. In the treatment of children with *colds* garlic may be used boiled in milk, and the liquid given as a drink, warm or cold, or the oil of garlic may be given in emulsion in the dose of 1 or 2 drops (0.05–0.1). It ought not to be given during the febrile stage, as it is stimulating. If the skin in any case is too delicate to permit of the use of pounded garlic alone, it may be mixed with equal parts of bran, and a regular poultice or plaster made thereof. Employed in this form, allium is useful if applied over the spine or feet in the treatment of the *cerebral* and *spinal convulsions* of infants; placed over the belly in cases of *gastro-intestinal catarrh*, it acts almost as well as a spice poultice. Allium-juice has also been used, in the dose of 2 to 5 drops (0.1–0.3) to relieve *nervous vomiting*. The dose of the syrup (*Syrupus Allii, U. S.*) for a child is 1 drachm (4.0), but 4 drachms (16.0) may be given to an adult.

ALLSPICE.

Allspice, or *Pimenta* (*U. S.* and *B. P.*), is the nearly ripe fruit of *Pimenta officinalis*, a tree of the West Indies. It contains an official volatile oil (*Oleum Pimentæ, U. S.* and *B. P.*), used for flavoring purposes, as a constituent of spice plasters, in diarrhœa mixtures, or as a carminative. It will also prevent the griping of purgative medicines. The dose of the oil is 1 to 5 drops (0.06–0.3). *Aqua Pimentæ* (*B. P.*) is given in the dose of 1 to 2 ounces (32.0–64.0).

ALMONDS.

Almonds are official in the form of the bitter almonds (*Amygdalus Amara, U. S.* and *B. P.*) and the sweet almonds (*Amygdalus Dulcis, U. S.* and *B. P.*). Bitter almonds develop hydrocyanic acid in the presence of water, by the reaction between the amygdalin and water in the presence of the emulsin contained in them; this is not the case with sweet almonds.

Sweet almonds, when rubbed up in a mortar with water, form a pleasant-tasting emulsion of an agreeable odor that is very useful as a vehicle for remedies having a disagreeable taste. Almond bread has been proposed as a food for diabetics, owing to its containing virtually no starch; but it is requisite that the oils and saccharine constituents of the almond shall first be removed. (See Foods for the Sick.)

When half an ounce of sweet almonds are rubbed up with thirty grains of gum arabic and two drachms of sugar, to which is added gradually a half-pint of distilled water, the mixture being then strained, an emollient and soothing drink is formed, which is very useful in *irritations of the stomach* and *intestines* and of the *air-passages* and *pharynx.* The expressed or fixed oil of almonds is a useful demulcent, and has been recommended in the *cough of phthisis,* given in the dose of a few drops in emulsion.

Bitter almonds give off an oil (*Oleum Amygdalæ Amaræ, U. S.*) which is exceedingly poisonous, owing to the prussic acid which it contains, and it is said that one drop will kill a cat, while seventeen drops have killed a man.

Bitter almonds are used to allay irritable coughs and similar states, but are not frequently employed, because other drugs are less dangerous, more stable, and more active as remedial agents. The emulsion of bitter almonds is made as is that of sweet almonds, and may be used in teaspoonful doses for the same purposes and as a vehicle in cough mixtures. Both emulsions are useful as vehicles in the treatment of *gonorrhœa,* as they diminish the burning on urination. Almond emulsions, when locally applied, are supposed to be of value for the removal of freckles and sunburn.

The preparations of sweet almonds are: an emulsion (*Emulsum Amygdalæ, U. S.* and *B. P.*), dose 1 to 2 ounces (32.0–64.0); a syrup (*Syrupus Amygdalæ, U. S.*), dose 2 drachms to 2 ounces (8.0–64.0); a compound powder (*Pulvis Amygdalæ Compositus, B. P.*), given in the dose of 1 to 2 drachms (4.0–8.0); and the oil (*Oleum Amygdalæ Expressum, U. S.* and *B. P.*), the dose of which is 1 to 4 drachms (4.0–16.0) *Aqua Amygdalæ Amaræ* (*U. S.*) is prepared from the oil of bitter almonds. The dose is 30 to 60 drops (2.0–4.0).

ALOES.

Aloes, or *Aloe* of the *U. S. P.*, is derived from *Aloe Perryi,* or *Aloe vera.* In the U. S. P. of 1890 the first is called Socotrine aloes (*Aloe Socotrina, U. S.*), the second Barbadoes aloes (*Aloe Barbadensis, U. S., B. P.*). Aloes is the inspissated or dried juice of the leaves of the plant. It is also probably derived from several other species. Aloes contains an active principle known as aloin (*Aloinum, U. S.*), which is a crystalline substance. As aloin is generally sold it is, however, an amorphous powder of extremely bitter taste.

Physiological Action.—Locally applied to the tongue, aloes is a bitter of rather a persistent taste. According to the studies of Rutherford, the drug increases very considerably the flow of bile in the dog, but in man it cannot in any sense be regarded as a medicament for the production of an increased biliary flow. Rutherford's doses given to the dog amounted to as much as sixty grains, equal to three or four drachms in man. In the lower animals and in man aloes acts very slowly, requiring many hours for its influence to be distinctly [illegible] the dose be toxic in amount. As much as four drachms [illegible] have been injected into the veins of a horse without inducing [illegible] probably because four drachms were not enough to affect [illegible] has been used endermically, and when so employed is said to act thoroughly. It is eliminated by the milk of nursing women, and will cause purgation in an infant put to the breast of a patient taking it. If the doses be quite large (10 to 20 grains), the passages will be watery; but if the dose be more moderate (2 to 3 grains), the stools will be thick and pultaceous.

Therapeutics.—Aloes should be used only when a somewhat slow stimulant to peristaltic movement is desired, and never where the object of the physician is to relieve congestions by depletion through the intestine. It is a favorite remedy in cases of *subacute* or *chronic constipation*, but it is distinctly harmful if continued for any length of time, as it seems to produce atony of the bowel. Owing to its bitter properties it acts as a tonic to the stomach, and is often given with iron to promote the absorption of this metal by stimulating the liver and by preventing any constipation which might be produced by the chalybeate.

When taken in a large enough dose to produce a copious passage, aloes nearly always produces a feeling of weight and fulness in the region of the rectum after the evacuation, and the writer has seen severe rectal catarrh produced in this way. If given alone it is very apt to produce griping, and it ought always to be combined with other drugs whose tendency is to prevent intestinal spasm.

In cases of *hæmorrhoids* occurring in persons suffering from general muscular relaxation and atony, aloes is said to do great good, but its use under these circumstances is by no means universal or generally accepted as correct. For weak, anæmic persons leading sedentary lives it may be combined with tonics to relieve the *constipation* so often a pressing symptom in these cases. In *amenorrhœa* dependent upon atony of the sexual system, or anæmia, or constipation, it is thought to have a specific emmenagogue influence. Locally applied in the form of the glycerole of aloes, it has been employed in the healing of *old* or *new fissures* of *mucous membranes*, and even in *bed-sores*. The glycerole of aloes is to be made by evaporating four to eight parts of tincture of aloes and gradually adding thirty parts of glycerin.

Contraindications.—Constipation occurring in plethoric persons should not be treated by aloes, and it should not be used if any irritation or catarrh of the intestine is present. Pregnant women should use aloes most carefully, lest abortion be produced, and if hepatic congestion or inflammation is present it ought not to be used. Fever is said to contraindicate the use of aloes, as does also rectal catarrh.

Administration.—Aloes is generally given in a pill, combined with spices and belladonna. (See Constipation, Part IV.) The dose should be about 1 to 5 grains (0.06–0.3) as a laxative, and 10 grains (0.6) as a purge. The *Aloe Purificata*, *U. S. P.*, should always be used. The official preparations most commonly employed are the pill of aloes (*Pilulæ Aloes*, *U. S.* and *B. P.*), 2 grains (0.12) each of aloes and soap; the pill of aloes and myrrh (*Pilulæ Aloes et Myrrhæ*, *U. S.* and *B. P.*), 2 grains (0.12) of each constituent; the pill of aloes and mastich (*Pilulæ Aloes et Mastiches*, *U. S.*), 2 grains (0.12) of aloes, or the "Lady Webster dinner pill;" the pill of aloes and iron (*Pilulæ Aloes et Ferri*, *U. S.* and *B. P.*), 1 grain (0.06) of aloes and

1 grain (0.06) of dried sulphate of iron; and the pill of aloes and asafœtida (*Pilulæ Aloes et Asafœtidæ*, *U. S.* and *B. P.*), containing 4 grains (0.26) of aloes, asafœtida, and soap. The dose of all these is one to two pills. Aloes is also official as *Extractum Aloes Aquosum*, dose 1 to 2 grains (0.06–0.12). The liquid preparations are the tincture (*Tinctura Aloes*, *U. S.* and *B. P.*), dose 1 to 3 fluidrachms (4.0–12.0); the tincture of aloes and myrrh (*Tinctura Aloes et Myrrhæ*, *U. S.*),[1] dose 1 to 2 fluidrachms (4.0–8.0); and the wine of aloes (*Vinum Aloes*, *B. P.*), containing cardamoms and ginger, the dose of which is ½ to 1 drachm (2.0–4.0) or even 2 drachms (8.0). The *B. P.* preparations, besides those given, are *Aloin*, given in the dose of ½ to 2 grains (0.03–0.12); the *Decoctum Aloes Compositum*, dose ½ to 2 ounces (16.0–64.0); and the extracts, *Extractum Aloes Socotrinæ* and the *Extractum Aloes Barbadensis*, the dose of each of which is 2 to 6 grains (0.1–0.3). *Enema Aloes*, given in the dose of 10 ounces (320.0), is composed of aloes 40 grains (2.65), carbonate of potassium 15 grains (1.0), and mucilage of starch 10 fluidounces (320.0).

ALUM.

Alum (*Alumen*, *U. S.* and *B. P.*) is the sulphate of aluminum and potassium in the *U. S. P.*, but in the *B. P.* both it and the sulphate of aluminum and ammonium crystallized from a watery solution are official. At present much of the alum of commerce is made in the manufacture of coal-gas for illuminating purposes, and it is therefore very cheap. It occurs in the form of octahedral crystals, and has an astringent taste and acid reaction. After the crystals are exposed to the air for some time they become covered with a white coating.

Physiological Action.—When alum is brought in contact with a mucous membrane it produces whitening, constriction, and puckering of the part, and applied to the skin thickens and toughens it by means of its astringent action. In either case it decreases secretion and causes contraction of the local blood-vessels and capillaries. Large amounts given for any length of time seem to increase secretion.

Poisoning.—Very large amounts are necessary to produce death. As much as two ounces will not kill a sickly dog. This is largely due to the fact that the vomiting and purging rid the animal of the drug, for if vomiting is prevented death rapidly ensues from gastro-enteritis, Injected into the blood, alum produces embolism and thrombosis.

Therapeutics.—Alum is used at present in a number of diseases, chiefly as a local application. In cases of ordinary *sore throat* applications of a strong solution (20 grains to the ounce of water—1.3–32.0) on a swab will be found very useful. It would be of much service in this condition were it not that it posseses a destructive action on the teeth. In *hemorrhage*, when the leaking blood-vessels can be directly reached, alum is a remarkable hemostatic, aiding in the arrest of the bleeding in three ways—namely, by coagulating the albumin, by constringing the parts, and by crystallizing when applied in large amounts on lint, and thereby affording a surface which is rough and aids coagulation. In hemorrhage after tooth-extraction its application is a very useful treatment. Dissolved in water or alcohol, 2 grains to the ounce (0.1 to 32.0), it makes an exceedingly efficient application for sponging in *night-sweats* or *localized sweating* of the feet or hands. In *hæmoptysis* a fine spray of a strong solution of alum, 20 grains to the ounce (1.3–32.0), may be employed, the necessity of the spray being made very fine being constantly borne in mind. This method may also be resorted to in *bronchorrhœa* or *chronic bronchitis* with excessive secretion, and in *chronic catarrh of the pharynx* and *larynx*. In *mercurial ptyalism* the drug may be used on a swab. Bathing the parts affected with an alum solution is said to be an efficient remedy in *chilblains*, and even for *pruritus vulvæ*. As a vaginal wash for excessive *leucorrhœa*, in the strength of from 10 to 20 grains to the ounce (0.65–1.3 to 32.0) of water, alum is of value. Some observers claim good results from its use in *diphtheria* and *tonsillitis*. In *follicular tonsillitis* the alum-stick may be deeply inserted into the depressed follicles or applied to the swollen surface of the gland. In *ingrowing toe-nail* with granulations a piece of twisted absorbent cotton soaked in strong alum solution and inserted under the edge of the nail will in most instances do a great deal toward a cure. Dried alum (*Alumen Exsiccatum*, *U. S.* and *B. P.*) is useful as a dressing for *old ulcers* and *sores*, and has been highly recommended as an application for *swollen gums* where they press upon and override a tooth, particularly at the back of the jaw. The possibility of its exercising an evil effect on the teeth should not be forgotten when this treatment is resorted to.

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[1] Sometimes called Elixir Proprietatis.

Internally, alum has been used in *diabetes*, *gastralgia*, and *dysentery* of an acute and chronic type. In *lead colic* it seems to be of value in conjunction with morphine to allay the pain. At one time alum was largely employed in *membranous croup* in emetic dose for the dislodging of the membrane and for the astringent effect exercised as it was swallowed and expelled.

The emetic dose of powdered alum is a heaping teaspoonful for a child or a tablespoonful for an adult.

Alum may be used as an antidote in *acute lead-poisoning*, as it is a soluble sulphate and also an emetic.

Glycerinum Aluminis (1 to 5) is official in the *B. P.*, and is used as a local astringent application.

AMBER.

Succinum is derived from a fossil resin found in Prussia and Bohemia, and is used in the form of the oil (*Oleum Succini*), which is volatile, quite irritant, and obtained by destructive distillation from the deposits named.

Therapeutics.—Oil of Amber is one of the best remedies for *persistent hiccough* that we have. It is very useful as a counter-irritant over *rheumatic joints*, and has been used in *asthma*, *whooping cough*, and *hysteria* with good results. In the *bronchitis of infants*, with nervous disturbance, oil of amber in the proportion of 1 to 3 parts of olive oil applied to the back and front of the chest is of service.

In adults suffering from *acute laryngitis* with an extension of the inflammation into the bronchial tubes full doses of sodium bromide given internally, with this proportion of amber oil and olive oil rubbed into the neck and chest, are very useful. The dose internally is 2 to 6 minims (0.1–0.3) given in emulsion.

AMMONIA (NH_3).

Ammonia is a gas of a very acrid, burning taste and sensation, capable of producing death very rapidly, when inhaled, by inflammation of the air-passages and the spasm of the glottis which ensues. It is made in large amounts in the manufacture of coal-gas.

Physiological Action.—When ammonia comes in contact with the tissues of the body it acts as a most powerful irritant, causing a reddening of the parts, followed, if the exposure be long enough, by local death and sloughing. If it be inhaled as a gas, it may produce rapid death by spasm or œdema of the glottis, and if a strong solution of it is swallowed, the same accident may occur. After more moderate inhalations severe bronchitis or pulmonary œdema may develop.

NERVOUS SYSTEM.—If ammonia be injected into the blood of animals, violent convulsions at once ensue which are largely tetanic in type and depend upon a spinal action of the drug, since they are not stopped by division of the spinal cord, as they would be if the convulsive movements had their origin in the brain. The drug in moderate amounts acts as a spinal excitant, increasing reflex action and all the evidences of spinal activity. If applied directly to a nerve, either motor or sensory, it paralyzes it, but if the drug be in very weak solution, it seems to increase its functional activity.

CIRCULATION.—Upon the circulation ammonia acts as a powerful but fleeting stimulant, increasing the pulse-rate, pulse-force, and arterial pressure. The cause of the increased pulse-rate depends upon stimulation of the accelerator nerves of the heart and of the heart itself, while the increase in force is due to the same cause, for Ringer and Sainsbury found the strength of the ventricles much increased. The rise of arterial pressure is due to the increased amount of blood pumped into the arteries by the stimulated heart, and probably by a stimulant action on the vaso-motor centre, although it is stated by some authorities that this is not so. As the drug acts as a stimulant on the respiratory centre, which is very near the vasomotor centre, it probably increases the functional activity of both. If by means of intravenous injection the ammonia reaches the heart in large amount in concentrated form, this organ ceases to beat at once, owing to paralysis of its muscular walls.

THE BLOOD.—In moderate amounts the drug has no effect on the blood, but when injected in poisonous quantities it causes the blood to fail to take up the oxygen, according to Feltz and Ritter.

RESPIRATION.—The injection of ammonia in moderate quantities into the blood causes an acceleration of the rate of respiration due to a stimulation of the respiratory centre, the respiratory movements becoming not only more full, but more rapid. If the drug is inhaled in small amounts or swallowed, the same action is seen in a less degree, the changes both in breathing and circulation being partly due under such circumstances to a reflex irritation transmitted along the sensory nerves.

ELIMINATION.—Ammonia when taken into the body is so extremely fleeting in its action that the question as to its escape from the system is of interest. If large amounts are taken, it is partly given off by the breath, but more of it is burnt up in the system, and, according to Bence Jones, eliminated as nitric acid by reason of its being oxidized in the body. Some think that it is in part excreted as urea.

Therapeutics.—Ammonia is employed for four distinct purposes in medicine—namely, as a circulatory and respiratory stimulant, as a counter-irritant, and as an antacid.

The indications for the use of ammonia in the first class of cases are all forms of sudden cardiac failure where there is no time or opportunity to use the more stable and slowly-acting drugs. These emergencies occur in *snake-poisoning*, in *syncope* from fright or other shock or indigestion, in *sudden cardiac failure* during the course of fevers and in pneumonia, and in all cases where rapid cardiac stimulation is needed. It is claimed, without great justification, that ammonia will aid in preventing *heart-clot* or thrombosis in cases of severe hemorrhage and in pneumonia. In the most pressing cases it should be injected directly into the vein of the leg, so as to act more quickly. If put into the subcutaneous tissues, it is almost certain to make a slough, and if injected into a vein of the arm, it may reach the heart in too concentrated form and cause cardiac depression. Ringer has found that the drug has the extraordinary power of causing a heart stopped or depressed by chloroform to return to its beating.

In prolonged diseases the employment of ammonia is not particularly advisable, owing to its fugacious action, although it is largely used, for the frequent administration necessarily required is apt to produce gastric disorder. Some persons claim that ammonia is useful as a sedative in *drunkenness*, but this is doubtful.

In *gastric acidity* due to fermentation, with the development of abnormal acids, ammonia is the most active remedy we can employ, but is not to be given if acute irritation of the stomach exists.

Locally applied, strong ammonia-water may be used to produce a blister by placing a few drops on the skin under an inverted watch-glass. Ammonia-water may also be applied, often with great relief, to the *spot stung by insects*. The waters of ammonia are used externally in stimulating liniments, and hypodermically when the drug is so given. The stronger water ought not to be employed for the latter purpose. The aromatic spirit is generally used internally in the dose of ½ drachm to 1 drachm (2.0–4.0), well diluted. This is also the dose of the ordinary spirit.

Administration.—Ammonia is never employed in medicine as pure ammonia, but in the form of the stronger water (*Aqua Ammoniæ Fortior, U. S.; Liquor Ammoniæ Fortior, B. P.*), containing 28 per cent. by weight of the gas, and the weaker water (*Aqua Ammoniæ, U. S.;*

Liquor Ammoniæ, B. P.), which should contain about 10 per cent. by weight of the gas. The spirit of ammonia (*Spiritus Ammoniæ, U. S.*) is given in the dose of 30 to 60 minims (2.0–4.0) in water, and the aromatic spirit of ammonia (*Spiritus Ammoniæ Aromaticus, U. S.* and *B. P.*) in the dose of 25 to 60 minims (1.5–4.0) in water. The latter preparation is composed of carbonate of ammonium, the oils of nutmeg, lemon, and lavender, with alcohol and ammonia-water. *Spiritus Ammoniæ Fœtidus* (*B. P.*) contains asafœtida and is used in place of the aromatic spirit. Ammonia liniment (*Linimentum Ammoniæ, U. S.* and *B. P.*) is used over tender joints and muscles.

AMMONIAC.

Ammoniac (*Ammoniacum, U. S.* and *B. P.*) is a resinous gum obtained from *Dorema Ammoniacum*, and is used very little in medicine at the present time. Internally and externally it produces some irritation when brought in contact with the tissues, and may be used internally in the dose of 10 to 30 grains (0.65–2.0) in pills in cases of *chronic bronchitis* devoid of any active inflammatory process. It is official in the form of the plaster of ammoniac and mercury (*Emplastrum Ammoniaci cum Hydrargyro, U. S.* and *B. P.*), which is used as a stimulant over enlarged glands. Finally, there is the emulsion of ammoniac (*Emulsum Ammoniaci, U. S.* and *B. P.*), used in chronic bronchitis in the dose of a tablespoonful (16.0).

AMMONIUM (NH_4).

The following salts of ammonium are official, and are used for various purposes:

Acetate of Ammonium.

Acetate of Ammonium is used in medicine in the form of the spirit of Mindererus (*Liquor Ammonii Acetatis, U. S.* and *B. P.*), dose 1 to 2 fluidrachms (4.0–8.0), for the purpose of acting as an antacid in *gastric indigestion*, and also as a mild diaphoretic which is inferior to sweet spirit of nitre.

Benzoate of Ammonium.

Benzoate of Ammonium (*Ammonii Benzoas, U. S.* and *B. P.*) is employed chiefly for its diuretic influences, which depend entirely upon the benzoic acid present in the compound. It should be kept in well-stoppered bottles. As benzoic acid is eliminated as hippuric acid and ammonia as nitric acid, this drug may be employed in cases where the physician desires to make the urine decidedly acid; as, for example, in patients suffering from *catarrh of the bladder*, when the urine is loaded with phosphates, which are dissolved by this acidulation. The dose is 10 to 30 grains (0.6–2.0), which should be dissolved in water or, better, administered in cachets or capsules.

Bromide of Ammonium.

Bromide of Ammonium (*Ammonii Bromidum*, *U. S.* and *B. P.*) is really a crystalline salt, but is generally found in commerce as a white granular powder, which, when exposed to the atmosphere, becomes slightly yellowish. It is readily dissolved in water.

Physiological Action.—Applied to the mucous membrane of the mouth, the bromide of ammonium produces a salty taste, is markedly pungent, and dissolves readily in the oral secretions. If large amounts are swallowed, it causes burning pain in the belly and evidences of gastro-enteritis.

NERVOUS SYSTEM.—The action of this drug upon this part of the body is its most important effect. Given to the lower animals, it produces in frogs total loss of reflex activity, preceded, it is said, in some cases by tetanic convulsions, although no such motor disturbances may take place. In a series of studies undertaken by the writer to determine the exact effect of the drug it was found that the spinal cord was depressed, both on its motor and sensory sides, while the nerves and muscles escaped. These results are in accord with those of other investigators, who also found that the nerves are unaffected. On the cerebral cortex it acts as a very distinct sedative.

CIRCULATION.—Upon the circulation bromide of ammonium acts as a stimulant in small doses, but as a cardiac paralyzant if a large amount comes in contact with the heart. In medicinal dose it is distinctly stimulant to the circulation, but not sufficiently so to render it valuable as a circulatory stimulant, to the exclusion of other more powerful preparations.

Therapeutics.—The bromide of ammonium may be used in nearly every instance where bromide of potassium may be employed, and possesses the distinct advantage of being less depressant to the general system than the latter drug. It is, however, more apt to disorder the stomach even if given in moderate doses. In *epilepsy* it would seem to be of as much value as the potassium salt, and may be combined with it in some cases with success. (See article on Epilepsy, Part IV.) According to DaCosta, the drug is of very distinct value in *rheumatism* in the dose of 60 to 80 grains (4.0–5.3) a day, well diluted with water, although its manner of action in this disease is not known. The usual dose is 10 to 30 grains (0.65–2.0). It is incompatible with spirit of nitrous ether.

Carbonate of Ammonium.

Carbonate of Ammonium (*Ammonii Carbonas*, *U. S.* and *B. P.*) undoubtedly has an action exactly like that of the liquid preparations of ammonia, and is used either alone or with the chloride in the treatment of *bronchitis*, particularly when this disease occurs in babies and young children. It is also largely employed by surgeons in the treatment of children after a surgical operation to overcome the respiratory and circulatory depression produced by the anæsthetic.

The dose is 2 to 10 grains (0.1–0.65) in syrup of acacia and water. It is a rapidly-acting cardiac and respiratory stimulant.

℞.	Ammonii carbonat.	gr. xlviij (3.0).
	Syrup. acaciæ	f℥j (32.0).
	Aquæ dest.	q. s. ad f℥iij (96.0).—M.

S.—Teaspoonful (4.0) every two hours for a child of three or four years.

Chloride of Ammonium.

The Chloride or Muriate of Ammonium (*Ammonii Chloridum, U. S.* and *B. P.*) has an entirely different action and therapeutic use from the rest of this group. It possesses almost no influence over the heart and respiration, but does exercise a very stimulant effect on mucous membranes, increasing the secretion of mucus. The consideration of its use in diseases of the lungs can be found in the articles on Pneumonia and Bronchitis. Chloride-of-ammonium fumes can be obtained from a few grains of the drug heated in an iron spoon over a gas-jet or by means of a set of three wash-bottles. In one of these is placed stronger water of ammonia, in the other muriatic acid. Each of these is connected with a third bottle by means of glass tubing, this bottle being partly filled with water, through which the fumes in passing become purified and form the fumes of chloride of ammonium. The drug may also be used in a spray from an atomizer. It has been employed in *intermittent fever*, but has gone out of use, and has also been used in *neuralgias of the ovarian type* by Goodell and others. In the treatment of *chronic torpor of the liver* and *subacute hepatitis*, and even in *cirrhosis* and *hepatic abscess*, it has been thought of value. Many clinicians have found it useful in the treatment of the *gastric* and *intestinal catarrhs* of children of a very subacute type, and it is the routine treatment for all such cases which come under observation at the hospitals and elsewhere where the author has charge. The dose is 2 to 15 grains (0.1–1.0), preferably given with liquorice and water to mask the taste.

℞.	Ammonii chloridi	ʒij (8.0).
	Extract glycyrrhiz. fl.	f℥j (32.0).
	Aquæ dest.	q. s. ad f℥iij (96.0).—M.

S.—Teaspoonful (4.0) t. d. after meals for a child of five to ten years.

The chloride of ammonium may, however, be given in compressed pills, provided a large draught of *water* or milk is taken simultaneously to protect the stomach. (See article on Bronchitis for other prescriptions.)

Gillespie asserts that 10 grains (0.65) of chloride of ammonium given half an hour before meals gives extraordinary relief in *painful dyspepsia* due to hyperacidity of the stomach.

Iodide of Ammonium.

Iodide of Ammonium (*Ammonii Iodidum, U. S.*) should be kept in dark, well-stoppered bottles, and if deeply colored should not be dispensed. It may be employed in the dose of 2 to 5 grains (0.1–0.3) in all cases where the iodide of potassium is indicated, and seems to possess alterative influences equal to those of that salt. It has been recommended as a local application in cases of *enlarged tonsils* in the form of a solution of 30 grains (2.0) of the salt to the ounce (32.0) of glycerin, particularly if struma is the cause of the enlargement. The application is to be made once a day with a swab or camel's-hair brush. It is necessary that this solution be not exposed to the air or it will undergo decomposition.

Valerianate of Ammonium.

Valerianate of Ammonium (*Ammonii Valerianas, U. S.*) is the salt of ammonium commonly used in the *nervous unrest* of pregnant or hysterical women, or at the *menopause* in the peculiar nervous disorders apt to occur at that period. In poisonous doses it paralyzes the spinal cord in the lower animals. It is usually given in the form of the elixir of valerianate of ammonium, the dose of which is a teaspoonful to a dessertspoonful, or it is combined with the bromides, under which circumstances it is much more efficacious. The dose of the salt itself is 10 to 15 grains (0.65–1.0).

The sulphate of ammonium is never used in medicine. The phosphate of ammonium is employed in rheumatism in the dose of 10 to 20 grains (0.65–1.3). It is no longer official.

The *B. P.* preparations besides those already given are: *Sulphide of Ammonium, Oxalate of Ammonium, Liquor Ammonii Citratis*, dose 2 to 6 fluidrachms (8.0–24.0); *Liquor Ammonii Citratis Fortior*, dose 30 minims to 2 fluidrachms (2.0–8.0); *Liquor Ammonii Acetatis Fortior*, dose 25 to 75 minims (1.6–5.0).

AMYL NITRITE.

Amyl Nitrite (*Amyl Nitris, U. S.* and *B. P.*) is a very volatile, somewhat oily liquid possessing a peculiar penetrating pear-like odor. It is made by the action of nitric and nitrous acids upon amylic alcohol, and is not to be confounded with *nitrate* of amyl, which has a different physiological action and is never used medicinally.

Nitrite of amyl should be protected from light, heat, and fire.

Physiological Action.—When swallowed or inhaled the drug produces staggering, fulness in the head, roaring in the ears, duskiness of the face, and finally utter muscular relaxation, so that the animal or man falls to the ground. The heart beats very rapidly and forcibly, and the respiration becomes gasping.

NERVOUS SYSTEM.—Nitrite of amyl acts as the most rapid of all the nervous depressants and sedatives known, except prussic acid. Experiments show that its dominant action is on the motor side of the spinal cord. The motor cortex of the brain and the motor nerves are only affected by large amounts. Upon the nervous apparatus of sensation nitrite of amyl has no effect in medicinal amounts, and can never be used to relieve pain unless it be due to spasm or to angina pectoris. The muscles are depressed by toxic amounts.

CIRCULATION.—When nitrite of amyl is used the pulse becomes exceedingly rapid, while the arterial tension progressively falls. The increase in pulse-rate is due to depression of the centric inhibitory apparatus of the heart and to the sudden relaxation of the blood-vessels, by reason of which, the resistance being taken away, the heart beats faster. The fall of arterial pressure is due to depression of the vasomotor centres and the muscular coats of the blood-vessels. In very small amounts the drug stimulates the heart-muscle (Reichert), but its dominant action is that of a depressant.

THE BLOOD.—In medicinal dose this drug produces a chocolate color of the arterial blood, due to the change of oxyhæmoglobin into methæmoglobin.

URINE AND ELIMINATION.—The urine sometimes contains sugar after the use of the nitrite of amyl, and there is increased diuresis. The drug is eliminated very rapidly from the body by the lungs and kidneys.

TEMPERATURE.—If the nitrite of amyl be employed for any length of time, a most remarkable fall in bodily temperature ensues, which is probably due to diminished oxidation, but possibly to some effect on the heat-centres governing heat-production and dissipation. The vascular dilatation also greatly tends to aid in the fall of bodily heat produced by the drug.

Therapeutics.—Nitrite of amyl is used to *relax general* or *local muscular spasms*, for the relaxation of the spasm of *epilepsy* and for *aborting an on-coming fit*, for the prevention and subjugation of *strychnine convulsions* and *tetanus*, and for the relief of *angina pectoris*, provided the attack is accompanied by high arterial tension. It may be used in *puerperal eclampsia*, but it is a dangerous remedy, because of its relaxation of the uterus and the consequent danger of post-partum hemorrhage. In *dysmenorrhœa* with uterine spasm it often gives great relief. Nitrite of amyl has been used in cases of sea-sickness as a prophylactic and cure with considerable success. In *cardiac failure* from fright or anæsthetics amyl nitrite is often of great value in single whiffs. If it does not act at once under these circumstancs, it is worse than useless to push it. It has also been found of value in *whooping cough*, *laryngismus stridulus*, *asthma*, *spasmodic croup*, and *infantile convulsions*. In *migraine* with local vasomotor spasm and true hemianopsia it is very useful. In *strychnine poisoning* and *tetanus* it must be used between the spasms or else given hypodermically, as the respiratory cramp prevents its inhalation.

Administration.—The drug may be given by placing three to five drops on a handkerchief and inhaling the fumes, or it may be dropped on sugar and taken by the mouth in the same quantity.

It is important to remember the fact that the effects of the drug are more severe for a moment after its use than during its inhalation. The physician should warn the patient that the effect of the drug is sudden and alarming, and in nervous cases should direct that the inhalations be made gently, as a very full inhalation may produce unpleasant sensations of cardiac failure.

The best way for patients to use the drug is to have it in pearls of glass, each holding 3 minims (0.15). One or more of these may be crushed in the handkerchief and the fumes inhaled. Some of the pearls made by careless manufacturers are of such thick, strong glass that they are difficult to break, and if broken are apt to cut the fingers. These are, of course, to be avoided.

ANTHRAROBIN.

Anthrarobin, which was originally discovered by Liebermann, seems to possess equal value with its relative chrysarobin, and to be capable of acting as efficaciously as this substance in the treatment of skin diseases. It is a yellowish powder, tolerably stable in a dry atmosphere, not soluble in acids or water, but readily soluble in dilute alkaline solution or alcohol, at first making a solution of a brown color, which, as oxygen is taken up, passes to a green and finally to a violet.

Therapeutically, anthrarobin has been employed by Rosenthal and by Behrend, and more recently Kobner has recorded his experience with it, employing it with good results in a 10 to 20 per cent. solution in the various forms of *tonsurans* as a wash. Rosenthal has used it in *psoriasis* and *pityriasis versicolor* and *herpes*, and Behrend asserts that it is often better in its effects upon the skin than chrysarobin, as it produces less inflammation and only discolors the skin slightly. It also possesses the additional value of making so slight a stain on the linen that it can be removed by washing.

According to most authorities, it is best to keep the drug in alcoholic solution, and, if the bottle is well corked, such a mixture remains good for a week.

ANTIMONY.

Antimony itself is rarely used in medicine, owing to its insolubility, but is generally employed as the tartrate of antimony and potassium, or Tartar Emetic (*Antimonii et Potassii Tartras, U. S.; Antimonium Tartaratum, B. P.*), or in the form of the sulphide (*Antimonii Sulphidum, U. S.*); purified sulphide (*Antimonii Sulphidum Purificatum, U. S.; Antimonium Nigrum Purificatum, B. P.*); and sulphurated antimony (*Antimonium Sulphuratum, U. S.* and *B. P.*), sometimes called *Kermes Mineral*. The last three drugs are very rarely employed, and are unreliable preparations, although some practitioners use kermes mineral as an alterative circulatory depressant and sedative expectorant in the dose of $\frac{1}{6}$ grain (0.01) every hour or two. As an emetic the dose of *Kermes Mineral* is 1 to 4 grains (0.05–0.2).

The oxide of antimony (*Antimonii Oxidum, U. S.*) forms part of the *Pulvis Antimonialis*.

Tartar Emetic.

Tartar Emetic (*Antimonii et Potassii Tartras, U. S.; Antimonium Tartaratum, B. P.*) is made by boiling the oxide of antimony with nerves of breathing, the pneumogastrics, are also rendered inactive; secondarily, the cardiac failure readily causes pulmonary congestion; and, thirdly, the drug causes such an outpouring of liquid mucus into the bronchial tubes that the patient is drowned in his own secretions, which he is too weak to expel.

STOMACH AND INTESTINES.—Antimony in toxic doses is a powerful irritant to these portions of the body. In full medicinal amounts it acts as a slow but powerful emetic, producing much nausea. The vomiting is due to an action on the vomiting centre in the medulla and to a direct action on the stomach itself. The drug is, therefore, a centric and peripheral emetic.

Very full doses produce watery purging, attended with some griping and tenesmus.

ELIMINATION.—Antimony escapes from the body in all the secretions, but largely by the bowels. The latter method of elimination seems chiefly to follow poisonous doses, and purging is an effort at elimination.

Poisoning.—When toxic doses of tartar emetic are taken, the pulse at first becomes slightly weaker and slower, the skin becomes moist and relaxed, a general sense of relaxation comes on, and simultaneously a sensation of severe nausea and gastric distress appears.

Following this condition violent vomiting asserts itself. The ejected mass consists of the contents of the stomach—mucus, bile, and watery fluids, and perhaps blood. Purging appears almost as early as the vomiting, and consists first of the normal contents of the intestines, then mucus, then bile, and, very rarely, blood. These signs may rapidly pass away and the characteristic peculiar "rice-water" stools[1] of antimonial poisoning appear. The general condition of the patient is now most serious. The face is pinched, livid, and covered with a cold sweat. The pulse is rapid and shuttle-like—to and fro—or lost at the wrist; the arterial tension is almost *nil.* The respirations are faint and fluttering, and so shallow as hardly to be seen or heard. Cramps in the calves of the legs attack the patient, due to the abstraction of water from the tissues by the violent purging, and the temperature falls lower and lower as death approaches. The general condition is such that all the signs point to Asiatic cholera, and antimonial poisoning cannot be separated from this disease during an epidemic without a history of the case or a chemical analysis of the secretions, which ought always to be preserved.[2]

The treatment of antimonial poisoning consists in the internal administration of large amounts of tannic acid, in the use of the stomach-pump, and in the maintenance of an absolutely prone position. The patient should vomit into towels and not raise the head from the ground; the head, indeed, should generally be placed lower than the heels. External heat, alcohol, and digitalis should be used thoroughly, and opium should be employed hypodermically to allay pain and irritation, unless the respirations are too feeble. If the opium is greatly needed because of pain, and yet seems contraindicated because of depression, it should be accompanied by strychnine to stimulate the respiratory centre and overcome any depression produced by the opium.

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[1] A "rice-water" stool is one which, on standing in a glass, separates into two layers, the lower white and flocculent, the upper watery and almost clear.

[2] This is a good opportunity to state that the secretions and excretions of a person dying of any poison should be placed in a chemically-clean jar capable of being sealed tight. The same rule of cleanliness applies to the jars holding organs at the post-mortem. The jars should be ready, and no intermediate vessel used. They should be sealed at once, and kept so until claimed by the authorities.

Fatty degeneration of all organs may occur after acute antimonial poisoning.

Therapeutics.—Tartar emetic is employed for at least five separate purposes, the most usual of which is as a *circulatory quieter* and *sedative*. The indications for antimony as a circulatory depressant are not so generally recognized at present as they were at one time, on account of the introduction of other drugs. Suffice it to state that all states of *sthenic inflammation* with a bounding pulse, high fever, and symptoms showing the patient to be possessed of robust constitution permit of its use, while all asthenic conditions most emphatically contraindicate its employment. In the treatment of *colds*, to break *forming diseases*, and to allay *inflammation* it is given in moderate dose. It is useful in *sthenic bronchitis* as an expectorant. Under these circumstances it may be given in emetic dose; or, if emesis is not desirable, minute amounts given hourly are of value, such as $\frac{1}{60}$ of a grain (0.001) every hour, or a teaspoonful of a solution of 1 grain (0.05) to $\frac{1}{2}$ a pint (250 cc.) every hour may be used. This is a particularly useful method in children, as the solution is tasteless and it does not produce nausea and vomiting.

In the *acute catarrh of children*, which affects the stomach and entire alimentary canal and is associated with little fever, the use of the drug is extremely valuable, and often aborts an attack when given in the same dose as just described.

As an emetic antimony is slow but forcible. It ought not to be used in cases of poisoning by other drugs, owing to its slowness.

Before the introduction of anæsthetics emetic doses were employed to relax the muscles in reducing *dislocations* and *fractures*.

Tartar emetic is harmful if irritation of the stomach is present or if kidney changes are rapidly progressing. If one good-sized emetic dose is not sufficient to produce vomiting, it should not be repeated, but some other emetic or the stomach-pump be used, lest antimonial poisoning complicate the case. The emetic dose must be large enough to be effective, or none at all should be given. If this rule is disobeyed, systemic changes come on with undesirable severity in those cases where emesis fails to occur because of small doses.

As a *counter-irritant* antimony is employed in the form of an ointment whenever a very slowly acting and prolonged counter-irritation is to be maintained, as on the back of the neck in *epilepsy* or similar chronic states, and in old *enlargements of the joints*.

Antimony acts well as a diaphoretic, but its use is undesirable, owing to its disagreeable effects, such as nausea and intestinal disturbance, and because other, more pleasant, drugs act equally well.

Administration.—The dose of tartar emetic when there is an excited circulation is $\frac{1}{20}$ to $\frac{1}{10}$ of a grain (0.003–0.006) every three hours until an effect is obtained. As an emetic the dose is ½ to 1 grain (0.03–0.06). The wine of antimony (*Vinum Antimonii*, *U. S.*; *Vinum Antimoniale*, *B. P.*) contains only 2 grains of tartar emetic to each ounce, and may be used in the dose of ½ to 1 teaspoonful (2.0–4.0), or, as an emetic, in the dose of 1 to 2 tablespoonfuls (15.0–30.0). The compound pill of antimony (*Pilulæ Antimonii Compositæ*, *U. S.*, or Plummer's pill) is used as an alterative, and contains sulphurated antimony ½ a grain (0.03), calomel ½ a grain (0.03), guaiac 1 grain (0.06), and tragacanth: the dose is one to three pills.

The ointment of antimony (*Unguentum Antimonii Tartarati*) is used externally as a counter-irritant spread on a rag or piece of lint. Antimonial powder (*Pulvis Antimonialis*, *U. S.* and *B. P.*), or James's powder, contains oxide of antimony and phosphate of calcium, and is given occasionally as an antipyretic in the treatment of *rheumatism* and *fever* in the dose of 3 to 10 grains (0.15–0.65); it is best given in a pill.

The compound syrup of squill (*Syrupus Scillæ Compositus*, *U. S.*), otherwise known as "Coxe's hive syrup," contains three-fourths of a grain (0.045) of tartar emetic to the ounce. The dose is 20 to 30 drops (1.3–2.0) for an adult as a sedative, or from this amount to 1 drachm to a child as an emetic. *Liquor Antimonii Chloridi*, *B. P.*, is not official in this country, and in England is rarely used as an escharotic.

ANTIPYRIN.

Antipyrin is a derivative of coal-tar, its chemical name being phenyldimethylpyrazolon. It is also called *Phenozonum* (*B. P.*). It was discovered by Ludwig Knorr in 1884, and introduced into medicine by Filehne. Antipyrin is a white powder of a somewhat bitter taste, and is very soluble in water, less so in ether, alcohol, and chloroform.

When antipyrin is given to a man in full medicinal amount, it causes a sensation of buzzing and tightness of the head not unlike that produced by quinine. The bodily temperature, if normal, is depressed a fraction of a degree, but no other symptoms are manifested. If the dose be quite large, some blueness of the lips and finger-nails appears, chilly sensations are experienced, and finally a profuse sweat breaks out over the entire body, which is more severe if fever has previously existed. Large doses sometimes cause nausea and vomiting.

Physiological Action.—NERVOUS SYSTEM.—When a large poisonous dose of antipyrin is given to one of the lower animals, relaxation, utter loss of reflex action, and total inability to move come on at once, and death ensues. Somewhat smaller doses produce exceedingly severe tetanic and epileptiform convulsions, but consciousness seems to be preserved. It has been proved that the chief cause of the convulsion is an action of the drug on the brain.[1] Very large toxic doses, therefore, decrease reflex action, and smaller ones increase it, though medicinal amounts certainly lessen reflex activity to a notable degree.

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[1] See author's Boylston Prize Essay of Harvard University on Antipyretics, Philadelphia, 1891.

The cause of this failure of reflexes is depression of the sensory nerves and the receptive centres of the spinal cord. Medicinal amounts must, therefore, be regarded as very distinct nervous sedatives, acting much more actively on the nerves of sensation than on those of motion. Injected beneath the skin or applied to a mucous membrane, antipyrin is a powerful local anæsthetic, the anæsthesia lasting often for several days.

CIRCULATION.—The studies of a very large number of pharmacologists prove most conclusively that antipyrin has no effect on the circulation of the lower animals in moderate doses unless these be so frequently repeated that cumulative effects ensue. Many reliable clinical observers have asserted that the drug depresses the circulation in man in some cases, and antipyrin is certainly not a cardiac stimulant. The writer is confident, however, that antipyrin is not so distinctly a cardiac depressant as some think. Large, poisonous doses lower blood-pressure, unless convulsions are present, when the pressure is raised. The action of the drug on the circulation is nevertheless a very unimportant part of its power, and in most cases is not to be considered in the treatment of disease unless the circulation is feeble. In many of the cases where vascular depression and collapse have followed its use it has been employed in excessive amounts, or the fall in bodily temperature has caused the untoward symptoms. (See Fever and its Treatment.)

BLOOD.—No spectroscopic changes in the blood follow the use of medicinal doses of antipyrin in the ordinary individual, but in poisonous amounts it produces methæmoglobin. If the doses be toxic or idiosyncrasy exists, cyanosis may come on. That the blood is not destroyed by small amounts is proved by the absence of hæmatin in the urine of persons taking the drug. The corpuscles suffer no changes except in very pronounced poisoning, when they are said in become crenated and shrivelled.

RESPIRATION.—When antipyrin is given in lethal doses, death results from failure of the respiratory centre. Ordinary doses have no effect on this function, but large ones make the breathing more rapid.

TEMPERATURE.—In normal men and animals antipyrin in medicinal dose may be considered as without effect so far as bodily temperature is concerned. In fevered animals it has been found to lower temperature by decreasing heat-production and increasing heat-dissipation. That it does not do this by an action on the blood seems proved by the fact that the blood is not affected by medicinal amounts. The sweating does not cause the fall, since it takes place when no sweating occurs. It may, therefore, be considered that the drug directly affects the nervous heat-mechanism of the body.

KIDNEYS, TISSUE-WASTE, and URINE.—A large number of studies made upon man and the lower animals by competent investigators have brought about very considerable advances in our knowledge of the influence of antipyrin upon tissue-waste. It is useless to burden this volume with a discussion of their methods and results, which may be found in the author's *Essay on Antipyretics*. Suffice it to say that, while all observers are not agreed as to the effects produced, the deductions apparently to be drawn are that the drug diminishes the quantity of the urine excreted, and also decreases the elimination of the results of nitrogenous tissue-metamorphosis—or, in other words, is a conservator of the tissues of the body.

ELIMINATION.—The elimination of antipyrin goes on very rapidly indeed, and begins almost at once after its ingestion. Maragliano and Reihlen state that it appears in the urine in three hours after it is taken, so that at the fourth hour elimination is at its height, although it continues to be eliminated for twenty-four or perhaps thirty-six hours. According to Pavlinow, part of the antipyrin ingested is eliminated by the salivary glands.

Poisoning.—The treatment of poisoning by antipyrin consists in the administration of stimulants, the maintenance of bodily heat, the use of atropine to restore the tone of the vascular system, and, if cyanosis is alarming, the employment of oxygen inhalations.

Antiseptic Power.—Antipyrin exerts a very distinct antiseptic action in small amounts, delays all forms of fermentation, and destroys germs when it is present in large quantity.

Therapeutics.—Antipyrin is employed in medicine for two great purposes—namely, for the reduction of *fever* and the relief of *pain*—but its employment as an antipyretic is now entirely surpassed by its use as an analgesic.

As an antipyretic, antipyrin should be given in a few full doses rather than frequent small ones, as a general rule, since if the fever is of any severity the latter method of administering it will have no effect, and the constant dosing will produce a gradual saturation of the system without causing a fall of temperature. On the other hand, too large doses may depress the temperature to a point below normal and induce collapse. In the article on Fevers (Part IV.) the conditions are indicated in which the drug is best employed, these being the sthenic fevers as a rule, or instances where excessive outbursts of fever necessitate prompt reduction of temperature. In excessively *high temperature in pneumonia* it may prove of great value, and in *scarlet fever* and *smallpox* antipyrin is of service in some instances, although in *pneumonia*, as a rule, the condition of the patient indicates the use of cold to the chest as a local measure for the reduction of congestion or cold sponging to relieve fever. (See Pneumonia.) The use of the cold applications is always to be preferred to antipyrin in the reduction of fever, since they are safer, more reliable, and do not strain the kidneys, reduce the blood, or depress the heart in feeble patients. (See Cold and Fever.) When cold water cannot be used, then antipyrin may be employed. In phthisis antipyrin generally increases the sweating, produces oppression, and either fails to act as an antipyretic or produces collapse by exercising too great an effect. In *sunstroke* it frequently fails to influence the temperature, and ought not to be used.

Be the fever what it may, provided it be associated with any diseased process, antipyrin is absolutely useless so far as any influence over the course of the disease itself is concerned. It is a remedy to be used in the treatment of the symptom, not for the removal of the cause of the fever.

As an analgesic antipyrin is the peer of opium. Although the latter drug will relieve all forms of pain if it be pushed, it possesses many disadvantages not found in antipyrin. In deep-seated pains due to disease of the organs of the body, in inflammations and similar disturbances, antipyrin is useless. In *neuralgic* affections of all kinds it finds its sphere, particularly if the disorder be rheumatic, gouty, or due to nervous depression from nervous exhaustion or disease. Under the latter circumstances it is best combined with caffeine and a little bromide of potassium. (See Neuralgia.) In *rheumatism* it will give relief in a fairly large number of cases, not only relieving the pain and fever if they be present, but also actually modifying the disease. It seems, however, to increase sweating in acute articular rheumatism. In *gout* it is stated to have a specific curative effect upon the disease over and above the relief of the pain, but this is doubtful. Its use in *dysmenorrhœa* has been recommended, but its beneficial influence in such cases is doubtful. At one time it was thought that its use would relieve the *pains of labor* entirely, but this has, unfortunately, proved untrue. It may, however, be tried, when the suffering is very severe, in the dose of 15 grains (1.0). In the severe lancinating or darting pains of *locomotor ataxia*, and in the laryngeal and gastric crises complicating this disease, antipyrin is an invaluable and reliable remedy. Curiously enough, it seems to subdue acute attacks of pain in *posterior sclerosis*, but fails to control the slighter pains and muscular twitchings sometimes seen in this disease and in *myelitis*..

Some clinicians have used antipyrin with asserted great success in *diabetes mellitus*. In such instances the disease often depends on a gouty diathesis, and can be well relieved by salicylates. Antipyrin may be used hypodermically in the region of a *hypersensitive nerve* as a local anæsthetic. The anæsthesia produced by it lasts for several days, but the pain immediately after the injection is severe.

Antipyrin is a very useful remedy in *epilepsy*. (See Epilepsy.)

In *whooping cough* antipyrin has more frequently given relief in the writer's experience than any other remedy. It should be given to a child of five years in the dose of 2 grains (0.1) every four or five hours, the patient being watched for cyanosis and the drug stopped as soon as this symptom appears. Antipyrin generally decreases the frequency rather than the severity of the attacks of cough.

In *malarial diseases* antipyrin certainly exercises no antiperiodic influence, although it controls the febrile paroxysms to a great extent. Yet, while this is the opinion of the majority of those who have used it, it cannot be said that every observer has reached similar conclusions. Potter reports cases where the results obtained from its use were most satisfactory, particularly in the intermittent form of malarial poisoning. One cannot help thinking that frequently where antipyrin has been reported as acting as an antiperiodic it has simply lowered the fever, and so seemed to affect the disease.

In *acute coryza* the temporary relief produced by applying cocaine to the engorged Schneiderian membrane may be prolonged indefinitely by the use of a spray of antipyrin in the strength of 4 per cent. This produces a smarting sensation, which speedily passes away. The same treatment is of value in inflammations of the larynx and pharynx. Should cocaine solutions not precede the antipyrin, the primary irritant effects persist unless the strength of the solution of antipyrin is reduced to 1 or 2 per cent. It is always better to precede its use by cocaine.

Locally applied, antipyrin possesses very distinct *hæmostatic properties*, and for this purpose may be used in a 4 per cent. solution, either in liquid or in a spray. Under these circumstances it seems to act not by producing clots, which are disadvantageous from the standpoint of antisepsis, but by constringing the bleeding vessels. This hæmostatic property is very materially increased if a solution of tannic acid is added to it, when it forms a glutinous precipitate which controls the hemorrhage. The precipitate is best applied by means of a swab.

Antipyrin may be given with cocaine in *suppository* to check bleeding from hemorrhoids and relieve rectal pain. The cocaine must be used to prevent the antipyrin from causing pain when the suppository is first introduced.

Untoward Effects.—Aside from the results of poisonous doses, a certain number of cases taking this drug present slight cyanosis or duskiness of the hands and of the face about the nose and lips; the fingers may be cold and clammy, and the feet are often very cold; sweating is a very common symptom of the untoward influence of antipyrin, and pricking or tingling of the skin is not uncommonly seen. By far the largest number of these cases, however, suffer from disorders associated with the skin, and erythematous patches may be seen everywhere, more particularly on the hands and feet and about the face, arms, and chest. Occasionally pemphigus-like spots appear, and often large bullæ have been noted as present. Elsewhere are published the statistics, collected from medical literature, of 121 cases of untoward effects exercised by antipyrin.[1] An analysis of these shows that females were much more frequently affected than males, and that the most susceptible age was decidedly that of full adult life —namely, from thirty to forty years in both sexes. The dose causing these effects was most commonly a moderate one—from 10 to 15 grains (0.65–1.0), or even from 4 to 10 grains (0.2–0.65). This fact holds good with regard to both sexes. The time of onset of the symptoms varied somewhat, according to whether the drug was given in one excessive dose or in frequently-repeated *medicinal doses*. In many instances the appearance of the symptoms was sudden rather than gradual. As a rule, the duration of the symptoms did not exceed one to three hours, three days being the longest time mentioned. It is interesting to note, however, that of all these cases only six proved fatal, and in these there was ample cause for death aside from any effect of the drug. We can rest assured, therefore, in ordinary cases of disease that patients exhibiting untoward effects of antipyrin are not in any acute danger, although the symptoms may be temporarily most alarming. Typhoid fever seems, according to the statistics collected by the writer, to be the disease in which this unexpected influence manifests itself most frequently, but this may be due to the fact that it is so common a malady and is so frequently treated by means of antipyretics. Falck has collected a large number of cases of antipyrinism, and quotes Pusinelli as having seen vomiting often follow the use of this drug.

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[1] See author's Boylston Prize Essay on Antipyretics, Philadelphia, 1891.

Antipyrin very distinctly increases susceptibility of patients to taking cold, and ought not to be employed by those who are forced to go out of doors in cold weather.

Administration.—Owing to the solubility of antipyrin, it is most readily given in a little water in a wineglass or spoon. If its slight taste is disliked, it may be dissolved in any one of the aromatic waters or in syrup of bitter orange-peel or some similar vehicle. Most persons prefer to take it with water. The amount which may be given at a dose is 5 to 20 grains (0.3–1.3), but 3 to 5 grains (0.3) is the best dose in most cases, at least until it is seen how well it is borne.

Incompatibles.—When added to sweet spirit of nitre, antipyrin in the course of a few moments produces a blue, changing to a dark-green, color, owing to the formation of iso-nitroso-antipyrin, which is not poisonous, but when in the form of a dry powder is readily oxidized on exposure to slight heat. If this color is not formed, the spirit of nitre lacks its nitrous ether and is worthless, so that we have not only another incompatibility to remember, but a new means of testing the therapeutic value of all samples of sweet spirit of nitre which may be dispensed by druggists. Calomel and antipyrin have also been found to be incompatible.

ANTITOXIN.

This general term "antitoxin" is now applied to the blood-serum o. animals naturally, or rendered artificially, immune to a given infectious disease, and depends upon the discovery that such serum renders a person receiving it partly or completely immune to that disease. Because of the source of the remedial agent this plan of treatment is sometimes called serum-therapy or orrhotherapy.

In only one disease has this method really given us reliable and good results—namely, in *diphtheria*, in which malady the subcutaneous injection of antitoxic serum has proved itself a specific means of cure. (See article on Diphtheria.) The same plan of treatment has been tried in tetanus and all the eruptive fevers, and even in infection by the streptococcus, but the results as yet are not such as to render it of any value to the general practitioner.

Theoretically, the wide extension of serum-therapeutics is correct; practically, the results desired are not obtained except in the disease diphtheria.

APIOL.

Apiol itself is a camphoraceous body, derived from common parsley or *Petroselinum*. As its melting-point is very low, it cannot be kept in solid form, and is always dispensed in 75 per cent. solution. So far as is known to the author, no careful study of its physiological action has ever been made, but two French observers, Joret and Homolle, state that in overdose it causes ringing in the ears, intoxication, and severe frontal headache.

Therapeutics.—Originally introduced to combat *malarial fevers*, because of a fancied resemblance in its toxic action to quinine, apiol has at last found its true level as a remedy in *amenorrhœa*, given in the dose of 2 to 8 minims (0.1–0.5) three times a day for a week before the proper date for menstruation. It should be given, if possible, in capsules, owing to its bad taste. It is said not to possess any abortive influences, although it is often taken with this object in view.

Apiol is imported from France in capsules containing a little less than 3 minims (0.15), and is also put up in soft elastic capsules in this country.

APOMORPHINE.

Apomorphine is an artificial alkaloid obtained by the action of hydrochloric acid upon morphine in a sealed tube to which is applied a high heat. It is a whitish or gray powder, made up of minute crystals, which rapidly undergo decomposition when exposed to the air. The drug should be kept in dark bottles well stoppered. A very important point to remember is that solutions rapidly decompose, and, if employed, may produce poisonous symptoms. The drug ought to be freshly dissolved each time it is used. If the salt imparts an emerald-green color to 100 parts of water when shaken a few times, it should be rejected, unless it is found that the water contains small amounts of ammonia, which is supposed to be active in causing such a change.

According to Boyer and Guinard, there are two kinds of apomorphine sold. Each has a physiological effect different from the other. The crystalline form, which is the one always to be employed, causes, in overdose, irritation, spasms, trismus, vertigo, and hyperæsthesia; while the amorphous (never to be used) causes collapse, hypothermia, general weakness, feebleness of the heart and respiration, and anæsthesia.

Physiological Action.—One of the best studies of this drug is that of Reichert, who found that in poisonous doses it produces convulsions, and finally paralysis, both of which are chiefly spinal in origin.

NERVOUS SYSTEM.—On the nervous centres in the brain apomorphine acts as a stimulant, but the convulsions produced by poisonous doses are probably spinal. The motor and sensory nerves are paralyzed by poisonous doses, and even the muscles become poisoned and incapable of contraction. Medicinal doses have no effect.

CIRCULATION.—Apomorphine increases the rapidity and force of the pulse and raises arterial pressure, when given in moderate amounts, by stimulation of the accelerator nerves and the vasomotor centre. In large doses it acts as a circulatory depressant.

RESPIRATION.—After ordinary amounts no changes in respiration occur, but after poisonous doses the breathing becomes rapid and irregular.

VOMITING.—Vomiting is produced by a direct action of the drug upon the vomiting centre in the medulla, and not by an action on the stomach. Apomorphine is, therefore, a typical centric emetic.

Therapeutics.—Apomorphine is useful in nearly all cases where an emetic may be employed. In poisoning from other drugs, particularly depressants and narcotics, we have little knowledge of its safety, but, unless the stupor or circulatory change is very profound, the drug may be used with care. In subacute and chronic *catarrh of the stomach and air-passages* it may be useful in getting rid of the mucus by emesis, and it is a useful remedy in *acute bronchitis* when it is necessary to quiet irritation or when the secretion which has been poured out is very scanty.

Untoward Effects.—Apomorphine rarely causes disagreeable effects, but there are cases on record in which it has produced serious symptoms, even when given in ordinary doses. These symptoms have consisted in depression and collapse. One-fifteenth of a grain has caused death in a woman who had bronchitis, but was otherwise healthy. Probably in these cases the amorphous form already named was used.

Administration.—The drug when used as an emetic should always be given hypodermically and the solution be freshly prepared. The emetic dose is about $\frac{1}{10}$ of a grain (0.006), but as much as $\frac{1}{6}$ (0.01) may be used in strong patients. The expectorant dose is $\frac{1}{40}$ to $\frac{1}{25}$ of a grain (0.0015–0.003) by the mouth. No nausea is usually felt. The drug nearly always acts badly in children, and it is better not to use it in this class of patients. The salt used is *Apomorphinæ Hydrochloras*, *U. S.* and *B. P.* An injection (*Injectio Apomorphinæ Hypodermica*)—2 grains (0.1) dissolved in 100 minims (6.5) of camphor-water—is official in the *B. P.*

ARISTOL.

(See THYMOL IODIDE.)

ARNICA.

Arnica is a medicine derived from *Arnica montana*, a native plant of the Western United States and Europe. It holds a very high position in domestic medicine as a local and internal remedy in *sprains* and *bruises* and in the treatment of passive *hemorrhages*, *amenorrhœa*, and similar states. Two parts of the plant are official—the arnica-flowers (*Arnicæ Flores*, *U. S.*) and the root (*Arnicæ Radix*, *U. S.*, *Arnicæ Rhizoma*, *B. P.*).

Physiological Action.—When arnica is applied to a delicate skin, it produces burning and irritation, and even extensive skin lesions. According to the studies of the author, it slows the pulse, raises the blood-pressure slightly, and stimulates the vagus nerves. Toxic doses produce a rapid pulse from paralysis of these nerves.

Administration.—Arnica is rarely given internally. If it is so used, the dose of the tincture (*Tinctura Arnicæ Radicis, U. S.*) is 15 to 30 drops (1.0–2.0), and the same amount of the tincture of the flowers (*Tinctura Arnicæ Florum, U. S.*) may be employed. The solid (*Extractum Arnicæ Radicis, U. S.*) and the fluid extract of the root (*Extractum Arnicæ Radicis Fluidum*) are also official. The dose of these preparations is 3 to 5 grains (0.15–0.3) and 5 to 10 minims (0.3–0.65) respectively. The plaster (*Emplastrum Arnicæ, U. S.*) is very useful for external applications.

The tincture of arnica is the preparation usually applied to sprains and bruises, and the alcohol contained in this preparation accomplishes a large part of the good achieved.

The only British preparation is the tincture (*Tinctura Arnicæ*), which is given in the dose of 30 minims to 1 drachm (2.0–4.0).

ARSENIC.

Arsenic (*Arsenicum*) itself is never employed in medicine, but it is used in the form of arsenous acid or the arsenates of sodium, potassium, or copper.

Arsenous acid (*Acidum Arsenosum, U. S.; Acidum Arseniosum, B. P.*) is derived from arsenic-bearing ores by roasting them in a reverberatory furnace, when it rises in the form of a vapor which adheres to the walls of the furnace, requiring a second sublimation, owing to the first deposit being quite impure. It is soluble in water, is without odor, and when heated gives off the smell of garlic.

Physiological Action.—The changes produced in man by poisonous doses will be found considered under the heading of Poisoning, and the writer will now confine himself to a study of the effects of medicinal amounts.

Applied to the normal skin, arsenous acid produces no change of any moment whatever, but if the surface be broken or a wound or sore exist, its action is very powerful, and it destroys the tissues to a considerable extent. For this reason it has been employed as a caustic by "quacks" and to some extent by regular physicians, the latter using it to remove warts, condylomata, and similar growths, while the former have employed it chiefly as a "cancer cure," asserting that it would take the disease "out by the roots."

ABSORPTION.—Arsenic is slowly absorbed.

NERVOUS SYSTEM.—When small amounts of arsenic are given to animals, particularly those of the lower types as represented by the frog, reflex action is lost long before, or more rarely at the same time, that voluntary movement is put aside, and, finally, all sensation to pain produced by heat and pinching totally ceases. It is therefore quite evident that the sensory nervous apparatus is affected, and experiments have proved that the sensory tract of the spinal cord is at fault. Ultimately, however, the motor system also fails and complete motor palsy ensues. Arsenic in poisonous amount acts as a depressant poison to all protoplasm with which it may come in contact (Ringer and Murrell). In medicinal amounts the drug acts as a nervous excitant and as a stimulant to the trophic nervous apparatus.

CIRCULATION.—In moderate amounts arsenic has little or no influence upon the circulation. Large doses cause marked decrease in the force and frequency of the pulse, accompanied by a decided fall in arterial pressure, and in these amounts it is to be regarded as a distinct cardiac depressant which depresses all the heart's component parts, such as the ganglia, muscle, and nerves. The fall of the arterial pressure is due to vasomotor depression with relaxation of the general blood-vessels, more especially those of the abdominal cavity. According to Lesser, small doses cause it to act as a cardiac stimulant, increasing the pulse-rate. Arsenic is absorbed by the blood-vessels.

RESPIRATION.—In small amounts arsenic very distinctly stimulates the respiratory centre, and Lesser asserts that small doses stimulate the peripheral ends of the vagi in the lungs, but that in toxic quantities arsenic acts as a powerful respiratory depressant.

ELIMINATION.—Arsenic escapes from the body chiefly by the kidneys, skin, and bowels, but usually does not appear for from fourteen to sixty hours after its ingestion in medicinal amount. In poisoning the purging which is produced carries off much of the drug, but after medicinal amounts some traces of it may be found in the saliva and in the milk of nursing women. The writer has seen colic produced in infants taking milk at the breasts of women who were receiving large doses of Fowler's solution.

TISSUE-WASTE.—According to Chittenden and Cummins, arsenic in medicinal amount distinctly decreases tissue-changes. Large doses, however, greatly increase nitrogenous metamorphosis.

Therapeutics.—Arsenic is used in *chorea*, in which it is almost a specific, acting in an unknown manner. Small doses should be given at first, and later on the dose should be increased rapidly, as patients soon get accustomed to the drug. Cases are on record, however, in which the too rapid increase of the drug in medicinal doses has developed arsenical neuritis. As a tonic combined with iron it is invaluable in *malarial anæmia* and *cachexia*. In *atony of the mucous membrane* of the stomach and intestines it is exceedingly useful, and in ordinary *anæmia* and *debility*, combined with a simple bitter tonic, it is invaluable. Arsenic offers the best chance of saving cases of *pernicious anæmia*. In *leucocythæmia* and *pseudo-leukæmia* arsenic is again the remedy, and it must be constantly given up to the point of intolerance to be of value. In the latter disease good results have followed its use when intraglandular and intrasplenic injections of 4 drops (0.2) of Fowler's solution were used, and any case of severe anæmia where the stomach is disordered may be treated by giving three times the ordinary dose by the rectum in starch-water or by its use hypodermically in the proportion of 4 parts of water and 1 of Fowler's solution. In *malaria* it acts as a prophylactic, as a cure, and as an aid to convalescence. When the attacks of *intermittent fever* are far apart, arsenic is useful as an antiperiodic, quinine being withheld for use during the attack itself. Arsenic is of value, too, for the improvement of *depraved mucous membranes* of the respiratory tract, particularly in those persons who have not true tuberculosis, but *phthisical tendencies;* that is, individuals who continually have colds in the head, chest, or elsewhere.

No drug is so universally abused as is arsenic in the treatment of skin disease: it should never be employed in "wet" skin diseases; that is, those associated with much proliferation of new cells and the exudation of serum and other liquids. Its field of usefulness is in the *dry, scaly skin affections.*

Where the skin is affected in its lower layers arsenic is useless, and should be used only where the epiderm is diseased (Duhring).

In *psoriasis* arsenic at first makes the skin more red and seemingly worse, but this passes off and the disease gets well. This is important to remember, as otherwise the drug may be stopped just when doing good. *Pemphigus*, *lichen*, and *lepra* all yield to its influence in most instances.

In the treatment of *diabetes* and *pruritus vulvæ* the drug is said to be of value when given internally. In *gouty diabetes* the use of the carbonate of lithium and the arsenate of sodium is often of great service.

In *asthma*, particularly where the mucous membranes are at fault, arsenic is one of the best remedies that we have, either given internally or smoked in arsenic cigarettes, which are to be made as follows:[1]

℞.—Belladonnæ foliorum	gr. xcvj.
Hyoscyam. foliorum	gr. xlv.
Stramonii foliorum	gr. xlv.
Extract. opii	gr. iv.
Tabaci	gr. lxxx.
Aquæ	Oj.—M.
Ft. sol. et adde.	
Potassii nitratis	gr. clx.
Potassii arsenitis	gr. cccxx.—M.

Bibulous paper is to be wetted with this compound, and after drying is to be rolled up and smoked as a cigarette.

A more simple procedure is to wet bibulous paper in a solution of arsenite of potassium of the strength of 15 grains to the ounce.

In *chronic rheumatism* arsenic is very valuable in certain cases, but often fails to be of service. In *coryza*, in *cancrum oris*, severe *sore throat*, and *chronic nasal catarrh* it is to be employed internally, and in some cases of *hay fever* undoubtedly affords relief. The use of arsenic in all stages of *phthisis* often gives the most surprising results. In *gastric cancer* and *ulcer*, given in small amounts frequently repeated, arsenic will often do good by relieving the pain and checking the vomiting. It may be tried in the *vomiting of pregnancy* with some chance of success, and is often of value in the *vomiting of hand-fed babies* who are suffering from chronic gastric catarrh. It is also useful in the *morning vomiting of drunkards*. In *atonic dyspepsia* associated with *chronic diarrhœa* and with evidences of *dysentery* arsenic is of service, and in small amounts it is very valuable in frequently repeated doses ($\frac{1}{100}$ of a grain (0.0006) every hour) in all forms of *serous diarrhœa*.

For *gastric atony* or *torpidity* the following prescription is useful, but if irritation of the stomach is present it should not be employed:

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[1] Philadelphia Hospital Pharmacopœia.

℞.—Liq. potassii arsenitis	f℥ss (2.0).
Tr. nucis vomicæ	f℥j (4.0).
Aquæ	q. s. ad f℥iij (96.0).—M.

S.—Teaspoonful (4.0) t. d. in water after meals.

In old persons whose *feet become swollen* and hot after prolonged standing, and who have *shortness of breath* on exertion, arsenic does good, particularly if the cause be cardiac feebleness, when it increases the efficacy of digitalis or strychnine so greatly as to be generally indicated when these drugs are given.

Locally applied to *warts* and other growths of the skin for several days in the form of *Liquor Arsenicalis* (*B. P.*) or *Liquor Acidi Arsenosi* (*U. S.*) or of Fowler's solution, it causes the growth to drop off or to become very much loosened. Where the growth is very hard and horny, its surface should be softened by the application of liquor potassa before the arsenical liquor is applied. The same treatment may be used for *corns*, and salicylic acid can be employed in a similar manner, but is not so efficient. Where large growths with wide surfaces are to be attacked the physician must use arsenic most boldly or not at all. The danger of absorption is only escaped when the drug is used so generously as to destroy the tissues before they can carry on any absorption of the poison. Marsden recommended the use of 1 ounce each of arsenious acid and powdered gum acacia to 5 drachms of water as an application to *epitheliomatous growths*.

Administration.—Children generally bear more arsenic than adults, proportionately, and Ringer states that boys bear less than girls. The drug should generally be administered after meals, as it is apt to irritate the stomach if given when this viscus is empty. Whenever a patient is given arsenic, he should be cautioned to watch for any puffiness about the eyes, particularly in the morning on arising, and for slight laxity of the bowels and griping. These are signs that the drug should be stopped for a day or more. The swelling under the eyes may spread if the use of the drug is persisted in, and finally amount to general anasarca. This is due at first to a cellulitis, and afterward to a true effusion. (See Untoward Effects.)

The official preparations are: arsenous acid (*Acidum Arsenosum, U. S., Acidum Arseniosum, B. P.*), the dose of which is $\frac{1}{40}$ to $\frac{1}{20}$ of a grain (0.0015–0.003); the solution of the arsenite of potassium (*Liquor Potassii Arsenitis, U. S.; Liquor Arsenicalis, B. P.*) or Fowler's solution, the dose of which at first is from 1 to 5 drops (0.05–0.3) in water; the solution of arsenate of sodium (*Liquor Sodii Arsenatis, U. S.* and *B. P.*), or Pearson's solution, the dose of which is 1 to 5 drops (0.05–0.3), and the solution of arsenous acid (*Liquor Acidi Arsenosi, U. S.*), the dose of which is 1 to 5 drops (0.05–0.3). This is more irritating to the stomach than the other preparations. The iodide of arsenic enters into Donovan's solution (*Liquor Arseni et Hydrargyri Iodidi, U. S.* and *B. P.*), the dose of which is 1 to 3 drops (0.05–0.15), well diluted. Iodide of arsenic (*Arseni Iodidum, U. S.* and *B. P.*) is given in $\frac{1}{40}$ grain (0.0015) doses, and arsenate of sodium (*Sodii Arsenas, U. S.* and *B. P.*) in the dose of $\frac{1}{30}$ to $\frac{1}{10}$ of a grain (0.003–0.006).

Untoward Effects.—If arsenic is taken in full dose by a susceptible person, it may cause a marked dermatitis, with a sensation of severe burning in the skin. Pustulations may occur, and Falck asserts that an erysipelatous state may arise. Almost any form of skin lesion may follow its use internally or externally, but nearly all show irritation of the true skin. Even a scarlatiniform eruption followed by desquamations may ensue. In other cases the mucous membranes become inflamed and coryza and disorders may develop. (See Administration.)

Acute Poisoning.—Arsenic is a gastro-intestinal irritant, producing, when taken in poisonous dose, violent vomiting and purging, with great pain in the œsophagus, stomach, and entire belly. The passages finally become watery and resemble "rice-water" stools, but are to be separated from those of cholera and antimonial poisoning by the presence of blood and, if necessary, by chemical analysis. The mucous membrane is stripped off the bowel and appears in shreds in the passages. Very commonly about the third day, if the patient survives so long, an intermission in the attack appears, which will be followed by a return of all the symptoms, so that the physician must not give a favorable prognosis. In this symptom (remission) the course of arsenical poisoning resembles phosphorus-poisoning and yellow fever. Death generally occurs about the fourth or sixth day, and on or about the third day a peculiar skin eruption sometimes appears which may be of any character. In rare cases sudden pain, collapse, and death may take place after the ingestion of the poison. Widespread multiple neuritis may be brought on. A typical change always present in acute poisoning when the patient lives for any length of time is *fatty degeneration of all the tissues.*

TREATMENT OF ACUTE POISONING.—In addition to washing out the stomach by the stomach-pump, applying external heat and stimulants, the proper antidotes should be at once employed, and the only ones of any value are the freshly-precipitated hydrated sesquioxide of iron and magnesia. (See below.) The first is to be prepared by the precipitation of iron from one of its fluid preparations by the use of an alkali. Ammonia added to the tincture of the chloride of iron is efficacious, but the precipitate has to be repeatedly washed to rid it of an excess of this irritant. Magnesia is a better precipitant, because it not only precipitates the iron, but is an antidote itself. Monsel's solution and the so-called dialyzed iron may be employed in place of the tincture, but Monsel's salt is too irritating, and dialyzed iron is so readily precipitated that it needs no alkali, but may be given pure. Magnesia is a useful antidote when used alone.

Under the name *Ferri Oxidum Hydratum cum Magnesia* the *U. S. P.* recognizes an antidote for arsenic; this is often called the "*antidotum arsenici.*" The *U. S. P.* directs that this antidote should be kept on hand for immediate use in the following manner: Mix 13½ fluidrachms (50.0) of the official solution of the tersulphate of iron (*Liquor Ferri Tersulphatis*) with 4½ ounces (100.0) of water, and keep the mixture in a well-stoppered bottle. Rub 150 grains (10.0) of magnesia with a little water to a smooth and thin mixture; transfer it to a bottle capable of holding 32 ounces (1000.0), and fill the bottle with water. When the antidote is to be used, add the magnesia solution slowly to the iron solution and shake together until a homogeneous mass results. (See Iron, Hydrated, Sesquioxide of.)

After the use of the antidote emetics should be used, opium should be administered to allay irritation and pain, and large draughts of water be given to flush the kidneys and dilute the poison. In the later stages the danger from arsenical poisoning arises from the changes produced in vital organs.

Chronic poisoning by arsenic shows itself in great irritation of the air-passages, in the development of nephritis, in pigmentation of the skin, and in nervous symptoms due to inflammations of the nervous tissues in different parts of the system, such as patches of anæsthesia and localized loss of motor power. These anæsthetic areas are generally confined to the extremities, and extend only to the first or the second joint above. Sometimes the multiple neuritis produced by arsenic produces symptoms which resemble those of locomotor ataxia, to a very considerable extent. In other cases the action on the skin is the more marked, and various acute inflammatory conditions are produced. Arsenic often produces asthma in those exposed to it by reason of the irritation it causes in the bronchial tubes. Chronic poisoning is to be treated by withdrawal from the exposure and the use of iodide of potassium to aid in the elimination of the arsenic. The other symptoms are to be treated by the application of electricity, tonics, out-of-door life, and such measures as will improve the general condition of the patient. The prolonged use of arsenic, according to de Schweinitz, may produce vitreous opacities.

ASAFŒTIDA.

Asafœtida, U. S. and *B. P.*, is a gum obtained by making an incision into the root of the *Ferula fœtida.* It occurs in irregular masses of a dark-yellow or reddish color, which become still more red if exposed to the light and air. Asafœtida *in tears* is a term applied to the drug when it appears in the shape of drops or pearls, and is a form seldom seen. Its odor is penetrating and strong, and resembles that of garlic. When taken internally it causes a sensation of warmth and acts as a stimulant and carminative in the alimentary canal.

Therapeutics.—Asafœtida is used in medicine as a *carminative* which will particularly affect the lower bowel, and is useful in the *intestinal indigestion* of old persons when associated with *flatulence*, and in the flatulent *colic of children.* In the form of rectal injections it is of value for the relief of the *tympanites* of children and in that of adults during *typhoid fever.* It is also used as a stimulating expectorant in the later stages of *bronchitis.* In the nervous irritability of children it is often of service.

Administration.—Asafœtida is given in pills of asafœtida (*Pilulæ Asafœtidæ, U, S.*), of which two or three may be taken, each one containing 3 grains (0.15); the emulsion or milk of asafœtida (*Emulsum Asafœtidæ, U. S.*), the dose of which is ½ to 1 ounce (16.0–32.0);

and the tincture (*Tinctura Asafœtidæ*, *U. S.* and *B. P*), ½ to 1 fluidrachm (2.0–4.0). The suppositories contain what is equal to 40 drops (3.0) of the tincture; and the plaster of asafœtida (*Emplastrum Asafœtidæ*) is used where a faint counter-irritant and antispasmodic is needed. When intestinal indigestion and flatulence occurs in old people the following pill is of service:

℞.—Ex. nucis vomicæ	gr. v (0.30).
Ex. kolæ	gr. iij (0.15).
Asafœtidæ	gr. xl (2.6).—M.

Ft. in pil. No. xx.
S.—One night and morning.

The *B. P.* preparations not official in the *U. S. P.* are *Enema Asafœtidæ* and *Pilula Asafœtidæ Composita*, composed of asafœtida, galbanum, and myrrh; dose 5 to 15 grains (0.35–1.0).

ASPIDIUM.

Aspidium, *U. S.*, *Filix-mas*, *B. P.*, or Male Fern, the rhizome of *Dryopteris Filix-mas* is employed in medicine as a tæniacide or remedy against the *tape-worm*, and is a very efficient and valuable drug under such circumstances, being, perhaps, the most reliable of all the vermifuges except pelletierin. When employed the directions and precautions given in the article on Worms must be strictly followed (Part IV.).

Male fern taken in overdose is capable of producing poisoning, and according to Quivill causes when taken in overdose irritation of the gastro-intestinal mucous membrane and diarrhœa. If absorbed it acts on the central nervous system and causes paralysis, collapse, and death. The form and method by which it is eliminated are unknown. It may in overdose cause albuminuria and glycosuria. To go beyond 1½ drachms of the oleoresin (6.0) at a dose is dangerous.

Administration.—Male fern is rarely, if ever, used at present in its crude form, being employed most commonly in this country in the form of the oleoresin (*Oleoresina Aspidii*, *U. S.*); dose ½ to 1 fluidrachm in capsules, or as follows:

℞.—Oleoresin. aspidii Tinct. vanillæ	āā ♏xlv (3.0).
Pulv. acaciæ	ʒss (2.0).
Aq. destillat.	f℥j (32.0).—M.

S.—Take entire amount after fasting, and follow in two hours by a full dose of sulphate of magnesium.

The dose of the liquid extract (*Extractum Filicis Liquidum*) of the *B. P.* is 15 minims to 1 fluidrachm (1.0–4.0).

Katamaya and Okamoto, two Japanese investigators, and Poulssen, all state that castor and other oils should not be used after filix-mas is given, as oils increase the absorption of the active principle, and so predispose to the development of poisoning.

AZEDARACH.

Azedarach is the bark of the *Melia Azedarach*, or Pride of China, as it is sometimes called. It is found in Syria, Persia, the north of India, and in the Southern United States.

The berries have but little toxic power, and children may eat ot them largely without ill effect, but the bark itself is poisonous when taken in overdose, and produces symptoms resembling those of poisoning by spigelia or belladonna. It is employed as a remedy against the *round-worm*, and should be given in decoction made by boiling 2 ounces of the drug in 1½ pints (750 cc.) of water until there only remains a pint (500) of liquid. Of this from 1 to 2 tablespoonfuls (16.0–32.0) are to be given a child, and repeated every two hours until the bowels are opened. It has also been used as a fluid extract prepared by the ordinary means with alcohol, to which some white sugar should be added. The dose of this extract is a teaspoonful, and is not to be repeated. The decoction is the best form in which to use the drug.

BARIUM CHLORIDE.

One of the most recent and one of the best evidences of the value of the study of the action of drugs upon the lower animals is given us by this substance. It will be remembered that Brunton and Ringer of London, Kobert and Bary of Dorpat, and Bartholow and the writer in America have at various times published, during the last few years, studies concerning the effect of barium on the circulatory apparatus of the frog, dog, and man, and all of them are in accord in the statement that it slows the heart very greatly, steadies its rhythm, and at the same time increases the volume of blood thrown out of the ventricle. They have also found that barium increases blood-pressure, and Kobert has, by a series of careful experiments, concluded that it brings about this change by an action on the muscular coats of the blood-vessels.

If large doses are used in the lower animals, the heart suffers systolic arrest from over-stimulation, and the strongest irritation of the vagus nerves fails to relax the systolic contraction. Still more interesting is the statement that this failure of the vagi to inhibit the heart is not the result of paralysis of these nerves, but is simply due to the excess of cardiac contractile power. The slowing of the pulse is not due to inhibitory influence, but depends solely upon the stimulation of the heart-muscle, although it would seem probable that the vasomotor stimulation, by increasing the arterial resistance, may be at least a factor in the reduction of the pulse-rate. At one time, in the dog, after large doses, there is a period of increase of pulse-rate which is asserted to be due to stimulation of the accelerator nerves.

In most works on chemistry barium is stated to be an irritant poison, but to produce such evidences of its presence the dose given must be extremely large, and many times greater than any amount useful for medicinal purposes.

Therapeutics.—Barium chloride may be used in all forms of *cardiac disease* in which failure of the heart-muscle is present. In the treatment of *varicose veins* it is said to be of value, both when given internally and applied locally over the distended vessels.

A point worthy of remark is the character of the pulse-wave produced. While its volume is increased, it does not give that sensation of tenseness to the finger that does the pulse produced by digitalis, and the pulse-wave seems to be very considerably prolonged—a fact that the sphygmograph also records.

Administration.—The solution of barium chloride to be used internally should have the strength of 5 grains to the ounce (0.3 : 32.0) of water, and of this 1 or 2 teaspoonfuls (4.0–8.0) is to be given three times a day.

BELLADONNA.

Belladonna is botanically known as *Atropa Belladonna*, and is official in the form of the root (*Belladonnæ Radix*, *U. S.* and *B. P.*) and leaves (*Belladonnæ Folia*, *U. S.* and *B. P.*). It belongs to a very large class of plants which all have a similar physiological action. Belladonna contains an active principle in the form of an alkaloid known as atropine (*Atropina*, *U. S.* and *B. P.*), which is insoluble in water. The sulphate of atropine (*Atropinæ Sulphas*, *U. S.* and *B. P.*) is soluble.

Physiological Effects.—In man, full medicinal doses produce flushing of the face, redness and dryness of the fauces, dilated pupils, sometimes an erythematous rash over the skin, rarely diplopia and delirium. If the dose be still larger, the delirium becomes very marked and is wild and talkative. The pulse is rapid and wiry. The rash which appears resembles that of scarlet fever, but lacks the punctations. The skin may desquamate after the lapse of several days if the rash is severe.

In children belladonna is usually borne very well indeed, and opium very badly. When belladonna asserts itself in children and in susceptible adults the respiration is quickened, the eyes become bright and the cheeks red, but lines of pallor reach from the malar bones to the corners of the mouth, giving the face a curious expression.

ABSORPTION.—This drug is very rapidly absorbed.

NERVOUS SYSTEM.—Belladonna when given in medicinal amount approaching the toxic dose acts as a powerful excitant of the brain, producing talkative delirium. Locally applied, it depresses the peripheral sensory nerves.

When very large doses are given to animals, paralysis of the spinal cord comes on, followed by tetanic spasms, and finally by recovery. The primary loss of power is due to paralysis of the entire cord, and the second state, of convulsions, to the escape of the motor and sensory pathways from the paralysis before the inhibitory centres recover. As a result, any peripheral irritation causes violent explosions of motor power.[1] Even in large medicinal dose belladonna may be considered as a depressant to the motor nerves and as a quieter to sensory nerve-filaments. On voluntary muscles the drug has no effect, but upon unstriped muscles it acts as a depressant and antispasmodic. It distinctly lessens reflex action.

CIRCULATION.—Belladonna quickens the pulse by depression of the peripheral vagi and by stimulating the cardiac muscle and the accelerator nerves. It produces a rise of arterial pressure by stimulating the vasomotor centre and by the increased heart-action which it causes. In poisonous doses it causes a fall of arterial pressure due to centric vasomotor palsy, and depression of the muscular coats of the blood-vessels, but not to cardiac depression, as has been generally taught, for Reichert has proved that the drug is not a heart-depressant unless the dose is simply overwhelming. Sometimes when belladonna is given the pulse becomes slow, but in these cases the slowing is due to temporary stimulation of the peripheral vagi or to momentary depression of the cardiac motor ganglia.

RESPIRATION.—Atropine is a stimulant to the respiratory centre in ordinary amounts, but recent careful studies show that its high reputation as a respiratory stimulant is not based either on clinical or experimental evidence. In many cases it fails to increase the respiration at all, and it is certainly inferior to coffee and strychnine in the treatment of opium poisoning. In large doses it is a depressant and paralyzant to respiration, and produces death from respiratory failure due to paralysis of the motor nerves supplying the respiratory muscles, and probably by depressing the respiratory centres.

ABDOMINAL CONTENTS.—Belladonna increases peristalsis by depressing the peripheral ends of the inhibitory fibres of the splanchnic nerves, and by diminishing any tendency to spasm on the part of the muscular coats of the intestine.

ACTION ON SECRETION.—The drug decreases all the secretions of the body except the urine, which is sometimes increased in amount under its use. The decrease of secretion is due to paralysis of the peripheral nerve-filaments supplying the secretory cells of the glands.

BODILY HEAT.—When belladonna is used in large amounts there is nearly always a rise of temperature, which in children may amount to one or two degrees. In advanced poisoning the temperature rapidly falls.

ELIMINATION.—Atropine is eliminated by the kidneys and bowels with extraordinary rapidity, and this is one of the reasons why death from the drug is so rare. J. Harley asserts that it is entirely eliminated in two hours, and Meuriot states that not a trace of it can be found in twenty-four hours, and that it is partly destroyed in the liver. In a suspected case of poisoning the urine of the patient may be dropped in the eye of an animal, and, if atropine or belladonna has been taken, mydriasis will result.

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[1] If a homely simile, found useful by the writer in teaching, may be used, the inhibitory centres may be represented by a schoolmaster and the motor and sensory centres by two boys. The escape of chloroform in the room paralyzes them all, but, finally, the boys recover before their master and go off as truants (convulsions); at last the master (inhibitory centres) recovers, and order, or health, is restored.

Eye.—On the eye belladonna produces dilatation of the pupil by stimulating the sympathetic nerve-fibres of the iris and paralyzing the ocular motor fibres peripherally, but the dominant action of the drug is undoubtedly exercised upon the muscular fibres of the iris (Jessup). Littauer has recently asserted that dilatation is not due to sympathetic stimulation, but Jessup's conclusions are generally accepted as correct, although the teaching as to the influence of atropine on the eye has changed several times in the last few years. Belladonna generally increases intra-ocular tension.

Treatment of Poisoning.—Poisoning by belladonna is to be treated by the application of external heat if the patient goes into collapse, and the use of strychnine if respiration fails. Opium may be employed in carefully graded doses as the physiological antagonist, but large doses are of doubtful service, particularly if the respirations are not in a satisfactory state.

Therapeutics.—Belladonna is used to allay *excessive secretion*, to act as an *antispasmodic*, and to influence the circulatory apparatus when *local inflammations* are beginning, particularly in secretory glands. In *cardiac palpitation* small doses of belladonna internally, or its external use over the præcordium in the form of a belladonna plaster or ointment, is very useful. It is also our most useful vasomotor stimulant in *collapse*. Belladonna is of value in *neuralgias* and in the pains due to irritated peripheral nerves.

To check secretion in *night-sweats* it is one of the best remedies we have, and it is useful in excessive *idiopathic ptyalism*, as seen in children, or in that due to mercurialization. In *bromidrosis of the feet* and other localized sweatings it is useful, and may be employed locally or taken internally for their cure. It is the best drug we have for *checking the secretion of milk* in an inflamed breast, and under these circumstances it is best to smear it over the gland in an ointment. (See next page.) Belladonna may be used in *serous diarrhœa*, as it checks the disorder by stimulation of the splanchnic vasomotor filaments of the intestinal blood-vessels, which being inactive permit a transudation of liquid into the bowel.

Trousseau recommended as a local remedy 1 to 2 grains (0.05–0.10) of the extract of belladonna with 6 to 8 grains (0.30–0.40) of tannic acid in *leucorrhœa* dependent upon disease of the uterine cervix. This should be placed on a pledget of cotton and applied to the affected part daily, being allowed to remain all day. Ringer states that if pain is also present in these cases the following injection is of value:

℞.—Sodii bicarbonatis	ʒj (4.0).
Tr. belladonnæ	fʒij (8.0).
Aquæ dest.	q. s. ad Oj (500 cc.).—M.

This is to be injected into the vagina, the woman first being placed on her back with her buttocks raised, so that the drug may bathe the uterine cervix for some minutes.

As an antispasmodic, atropine is to be used in *torticollis*, injected directly into the muscle itself, so as to act on its motor nerve-fibres, and it may be given in *spasm of the intestine* with *cramps* and *griping*, while in *cramps in the legs and body*, either as a local application by means of liniments or when employed internally, it is of service. In *asthma* of the spasmodic type belladonna is a sovereign remedy, particularly if it be combined with morphine. It may be used both as a prophylactic and as a cure during the attack. Belladonna-leaves may be smoked by asthmatics, by rolling them into a cigarette or putting them into a pipe.

This drug is used in *whooping cough* at all ages and in all stages, but it must be given in large amounts in this disease to do any good.

In *spasm of the sphincter ani*, whether it be due to *fissure* or other cause, belladonna in the form of an ointment or suppository is of value. In *spasm of the urethra and bladder* the drug may be used internally and externally, and in the former state the ointment should be smeared along the under surface of the penis every night. This treatment is also useful in *chordee*. In the *colic* resulting from the passage of *hepatic and renal calculi* belladonna in full dose will very often give relief. Where *urinary incontinence* depends upon spasm of the bladder belladonna should be used. (See Urinary Incontinence.) In *dysmenorrhœa* in nervous women, with spasm of the cervix uteri, it is of very great value applied as an ointment or in a vaginal suppository, or when given by the mouth. For the *nervous cough of children* and adults belladonna is one of the best remedies we have. In *constipation* it does good by depressing the inhibitory nerves of the intestine. It is also of value in *laryngismus stridulus* and in *hiccough*. In spasms from peripheral irritations belladonna is of value. In *iritis* atropine is used to dilate the pupil and prevent adhesions. The solution to be dropped into the eye should contain 1 to 4 grains (0.05–0.20) of atropine sulphate to the ounce (32.0) of water. Atropine sulphate is also used for the purpose of producing *mydriasis*, before ophthalmoscopic examination, in solutions of the strength just given. It increases intra-ocular tension and is contra-indicated in glaucoma. When employed to act on the circulation it is to be used in *shock* and *collapse* from injury or in the course of severe disease. (See Shock.) During the progress of a case of *pneumonia*, *typhoid fever*, or other severe disease belladonna should be kept in the house, and administered freely if collapse or vasomotor relaxation suddenly asserts itself. Particularly is this true in the case of *pneumonia*. The vascular system after the crisis of this disease will often be found much relaxed, and heart stimulants do not seem to do much good. The administration of atropine or belladonna will dry the leaking skin, and by increasing the vasomotor tone produce great improvement. In *mastitis*, or inflammation of the breast, even where pus is beginning to be formed, belladonna, if pushed, will give surprisingly good results if given internally and applied locally. In *sore throat*, when the pharynx is hot and dry and has a sensation of rawness, while the local capillaries appear injected and red, belladonna is often of the greatest service if given in full dose, aborting the "cold." In *exoph-*

thalmic goitre belladonna is thought to act by stimulating the sympathetic nerves, and certainly gives relief in some cases, particularly if combined with strophanthus or digitalis. For the relief of local nerve-pains it is of value, and probably acts by quieting the irritated nerve. It should be applied in these cases in the form of an ointment or plaster, and if the ointment is used it should be well rubbed into the part affected.

In *headache* occurring in young persons, often due to over-work, with pain in the eyeballs and forehead and a sensation as if the orbits were too small for the eyeballs, belladonna is of service. In *intercostal neuralgia* or *pleurodynia* belladonna plasters may be applied to the spot where the pain is felt, with relief.

Use of Atropine in Poisoning.—Atropine acts as an antidote in cases where poisonous mushrooms have been eaten, and is a physiological antidote to opium, Calabar bean or physostigma, and jaborandi. In opium poisoning it acts as an antidote in all parts of the body except the eye, and in jaborandi poisoning the same facts hold true. In opium poisoning the drug should not be given after the respirations rise to ten from three or four per minute, as too much of the drug may be given and atropine poisoning may come on and complicate the case. The condition of the pupil is not a guide as to the effect of atropine in opium poisoning, because opium acts centrically and atropine acts peripherally on the nerves governing the iris. Atropine should be used in aconite, antimony, and hydrocyanic-acid poisoning for its influence on the vasomotor system, the respiratory centre, and the heart, and for the purpose of maintaining the bodily heat, the dissipation of which it retards by preventing vasomotor palsy and consequent dilatation of the peripheral blood-vessels. It should be borne in mind that atropine is not the very best single antagonist to opium, and that in opium poisoning it always should be largely aided by caffeine and strychnine.

Administration.—The dose of the sulphate of atropine (*Atropinæ Sulphas, U. S.* and *B. P.*), is $\frac{1}{250}$ to $\frac{1}{40}$ (0.0004–0.0015) of a grain. The alcoholic extract (*Extractum Belladonnæ Foliorum Alcoholicum, U. S.* and *B. P.*) is given in $\frac{1}{6}$ to $\frac{1}{4}$ grain (0.01–0.015) doses, and the tincture (*Tinctura Belladonnæ Foliorum, U. S.* and *B. P.*) in the dose of 5 to 15 minims (0.3–1.0). Both these preparations are derived from the leaves. The fluid extract (*Extractum Belladonnæ Radicis Fluidum, U. S.*) is given in 1- to 2-minim (0.05–0.10) doses, while the extract of the *B. P.* is given in $\frac{1}{4}$- to 1-minim (0.015–0.05) doses. These preparations are derived from the root. *Succus Belladonnæ, B. P.*, is given in 5- to 15-minim (0.3–1.0) doses. The preparations of the *B. P.* not official in the *U. S. P.* are *Liquor Atropinæ Sulphatis*, given in the dose of 1 to 6 minims (0.05–0.32); *Lamellæ Atropinæ*, each of which contains $\frac{1}{5000}$ of a grain of atropine; and *Unguentum Atropinæ*. Belladonna liniment (*Linimentum Belladonnæ, U. S.* and *B. P.*), belladonna plaster (*Emplastrum Belladonnæ, U. S.* and *B. P.*), and the ointment (*Unguentum Belladonnæ, U. S.* and *B. P.*) are for external application.

Recent experiments show that belladonna decreases gastric secretion very considerably in some persons. It is better, therefore, not administer it just before or immediately after a meal.

BENZOATE OF BISMUTH.

This is a preparation which has been highly recommended in Germany, and to some extent in this country, within the last few years, in the treatment of *chancroid*. Under its influence the sore heals up with great rapidity and leaves a comparatively small cicatrix. It may also be used in the treatment of all specific sores and for the dressing of indolent or *sloughing ulcers*. Benzoate of bismuth, when properly applied, should be preceded by a careful washing of the diseased surface with a very weak bichloride-of-mercury solution, after which the bismuth is to be sprinkled over the wound and the entire surface covered with cotton, which should be held in place by an adhesive strip. The only disadvantage in this dressing lies in the fact that it has to be changed once or twice in every twenty-four hours. Immediately after it is applied it may produce some tingling or burning, but this is never very severe.

BENZOIN AND BENZOIC ACID.

Benzoin (*Benzoinum*, *U. S.* and *B. P.*) is a resinous balsam derived from the *Styrax Benzoin*, which is a native of Sumatra, Borneo, and Java. Benzoic acid is obtained by the sublimation of gum benzoin, or is prepared artificially, chiefly from toluol. The last preparation is not to be recommended, as it often disorders the stomach and leaves a disagreeable taste in the mouth. It is benzoic acid which is generally used in medicine.

Physiological Action.—Locally applied in concentrated form, benzoic acid is an irritant, and taken internally in excessive amount it causes a sensation of warmth and burning. It is eliminated as hippuric acid, and increases the acidity of the urine. On the lower forms of life it acts as an antiseptic and germicide. In persons having an idiosyncrasy to benzoic acid it is not uncommon for urticaria to follow the use of the drug. Sometimes a papular or erythematous eruption appears.

Therapeutics.—Benzoic acid is useful in the treatment of *chronic cystitis* with alkaline urine which is loaded with phosphates, and, combined with cannabis indica, acts well in the later stages of *gonorrhœa*. Senator states that in the dose of 2 or 3 drachms (8.0–12.0) a day it is a specific in *acute rheumatism*, and thinks it equal to salicylic acid. When these doses are to be used, the benzoate of sodium should be employed, owing to its solubility. In *acute laryngitis* accompanied by great hoarseness the inhalation of steam laden with compound tincture of benzoin is of the greatest service. A tablespoonful (16.0) of this tincture should be placed in a pitcher of boiling water, the face held over the liquid, and a towel thrown over the head of the patient to retain the steam. The drug cannot be used in an atomizer, as it clogs the "tips." Taken internally, benzoic acid is useful in *chronic bronchitis.*

Administration.—The dose of benzoic acid (*Acidum Benzoicum, U. S.* and *B. P.*) is usually 10 to 40 grains (0.6–2.6), but a drachm may be given in capsule. The gum itself is never used as such. The tincture (*Tinctura Benzoini, U. S.*) is given in 30-minim to 1-drachm (2.0–4.0) doses, and the compound tincture (*Tinctura Benzoini Composita, U. S.* and *B. P.*) is composed of benzoin, aloes, storax, balsam of Tolu, and alcohol, the dose of it being 1 to 2 fluid-drachms (4.0–8.0). The preparations official in the *B. P.*, but not in the *U. S. P.*, are the troches (*Trochisci Acidi Benzoici*) and *Unguentum Cetacei.*

Adeps Benzoinatus (*U. S.* and *B. P.*), or benzoated lard, is simply a non-rancid basis for many ointments, notably that of zinc.

BICARBONATE OF POTASSIUM.

This salt (*Potassii Bicarbonas, U. S.* and *B. P.*) is used for the same purposes as the citrate and acetate of potassium, and, as it is much less agreeable in taste, should not be employed when they can be obtained. From the bicarbonate of potassium are made several very useful preparations: the liquor potassii citratis, by adding 120 grains (8.0) to 90 grains (6.0) of citric acid and 10 ounces (320.0) of water; the neutral mixture, by adding to 1 pint (500.0) of lemon-juice enough of the potassium salt to neutralize it. The dose of *potassii bicarbonas* is 5 to 40 grains (0.3–2.6), or even as much as 2 drachms (8.0) may be given if well diluted with water.

BICARBONATE OF SODIUM.

Bicarbonate of Sodium (*Sodii Bicarbonas, U. S.* and *B. P.*) is largely used as an antacid in *gastric fermentation* and in *sick headaches* arising from this condition. Combined with calomel in powder, it certainly adds to its efficiency in increasing biliary flow, as all alkalies of this class liquefy and thin the bile. The drug has been widely employed in the treatment of *rheumatism*, and is found to be of great service in allaying *pain and soreness in the joints* when used in a lotion made by dissolving it in water and applying it to the part on lint or rags. In *acidity of the stomach* the following effervescing powder is useful: Bicarbonate of sodium (*Sodii Bicarbonas*), 30 grains (2.0) in one paper, and in the other 10 grains (0.7) of tartaric acid (*Acidum Tartaricum*). These are each dissolved in half a tumbler of water, added to one another, and swallowed during effervescence.

BISMUTH.

Bismuth (*Bismuthum, B. P.*) is official as the subcarbonate (*Bismuthi Subcarbonas, U. S.*), the subnitrate (*Bismuthi Subnitras, U. S.*

and *B. P.*), the citrate (*Bismuthi Citras, U. S.* and *B. P.*), and the bismuth and ammonium citrate (*Bismuthi et Ammonii Citras, U. S.* and *B. P.*). The first and second are identical in their dose (5 to 20 grains—0.3–1.3) and action, and may be employed interchangeably. The third and fourth are more astringent and more irritating than the other two, and must be given in a smaller dose, which is 2 to 4 grains (0.1–0.2).

Many years ago this drug was supposed to be capable of producing gastro-enteritis when given in large doses, but this was due to a contamination by arsenic. Bismuth may produce chronic poisoning after prolonged use on wounds or when internally administered in excessive doses for some time. Ordinary doses are innocuous. As much as 4 to 5 drachms a day may be given for a short time without harm. The changes which ensue are the formation of black sloughs in the mouth and gastro-intestinal tract, desquamative nephritis, and albuminuria. The preparations of the *B. P.* not official in the *U. S. P.* are the *Liquor Bismuthi et Ammonii Citratis*, dose ½ to 1 fluidrachm (2.0–4.0), and the troches (*Trochisci Bismuthi*), 2 grains (0.1) in each. *Bismuthi Carbonas, B. P.*, is the same as the subcarbonate of the *U. S. P.*

PHYSIOLOGICAL ACTION.—Bismuth in the form of the subnitrate and subcarbonate is devoid of any effect upon the general system, and locally applied externally, or by its internal use only, exercises a mild astringent and protective influence upon the mucous membranes.

Therapeutics.—Bismuth is used as an astringent in large doses to cover the surface of *inflamed mucous membranes* and so to allay irritation. It is useful in *irritative vomiting* for this reason, and in *diarrhœa* of a similar type in which the stools are serous. If the passages are mucous, castor oil should precede bismuth in order to rid the alimentary canal of the mucous secretion already poured out. It is very useful when combined with carbolic acid in *serous diarrhœa*, given in capsules containing 5 grains (0.3) of bismuth subnitrate and 1 drop (0.05) of carbolic acid. It is also to be used as a slow and feeble antacid. The *Bismuthi et Ammonii Citras* is very astringent, and should be used in *chronic serous diarrhœas* in the dose of 5 grains (0.3) every two or three hours. The other preparations of bismuth are insoluble, and they should not be given in water, but this preparation is soluble and may be given in solution. Bismuth is of service in *dyspepsia* when lactic and butyric acid fermentation is present with excessive belching, and may be employed in *gastralgia* and *gastric ulcer* and *gastritis* as a sedative and astringent. Bismuth and ammonium citrate must never be employed if acute inflammation exists.

When the salts of bismuth are used for any length of time, they cause the odor of garlic to appear in the breath, which is due to the presence of an exceedingly slight trace of tellurium in the bismuth. The stools are apt to become black under the influence of bismuth, and the tongue, if furred, may also be black about the centre when bismuth is used.

Where there is chapping of the hands or cheeks from exposure to cold or wet the following prescription is useful:

℞.—Bismuthi subnitratis . . . . ʒiij (12.0).
Zinci oleatis . . . . ʒiij (12.0).
Lycopodii . . . . ʒij (8.0).—**M.**
S.—Apply to the parts t. d.

BISMUTH SALICYLATE.

(See Salicylate of Bismuth.)

BISMUTH SUBGALLATE.

Dermatol, or the subgallate of bismuth, was first used by Heinz and Liebrecht. It is a fine yellow powder which is unaffected by long exposure to light and air, is entirely odorless, and is supposed to contain 55 per cent. of oxide of bismuth. Its external uses are identical with the uses of iodoform, and it probably acts in much the same manner as does the latter drug—namely, by so drying the wound that it becomes an unfavorable soil for the growth of germs. As dermatol is an astringent, it cannot be employed in the treatment of indolent ulcers, which need stimulation rather than an astringent influence, and it would seem probable on theoretical grounds that it is not to be compared to iodoform in the treatment of cases in which tubercular processes are going on.

There is no doubt that dermatol is less poisonous than iodoform, but it must be capable of producing some untoward effects if used profusely for any length of time, since poisoning follows the prolonged employment of bismuth preparations, as has been determined by Balzer, Dalché, and Villejean, for the symptoms of which see the article on Bismuth.

Dermatol may be tried in cases of skin disease in which there is much secretion, as in weeping *eczemas* and similar states, either in the form of a dusting-powder or in an ointment with vaseline or lanolin in the proportion of ½ to 1 drachm to the ounce (2.0–4.0 : 36.0). Sometimes its efficiency can be much increased by the addition of an equal part of oxide of zinc to the prescription just given.

Dermatol has been used in cases of *purulent otitis media* and many states requiring similar effects with marked success.

Internally, it has been highly recommended in cases of *fermentative dyspepsia* in the dose of 5 to 10 grains (0.3–0.65), but its real value in this condition is as yet undetermined.

BITARTRATE OF POTASSIUM.

Potassii Bitartras, *U. S.*, *Potassii Tartras Acida*, *B. P.*, is sometimes called "cream of tartar" or acid tartrate of potassium. It is a white gritty powder which may occur in rhombic crystals. Owing to its stability, it has been thought that it escaped from the body without oxidation, and so to differ from the other potassium salts formed from vegetable acids. This is probably incorrect.

Therapeutics.—The bitartrate of potassium is the most diuretic of the potassium salts, and is used in *chronic nephritis* with gin or compound infusion of juniper, when it is very useful in removing dropsy. 1 ounce (32.0) of the salt is added to a pint (500 cc.) of the infusion of juniper-berries, and the entire quantity taken in divided doses in twenty-four hours. In *acute renal disease* the drug should be used without the juniper. In large doses—½ an ounce (16.0)—it acts as a watery purge, but is rarely so used. Where the *urine is thick and alkaline* bitartrate of potassium is a useful remedy to neutralize it and make it clear and normal in appearance.

BORAX AND BORIC ACID.

Borax, or *Sodii Boras* (*U. S.* and *B. P.*), may be made by the action of boracic or boric acid upon soda, but the drug as it appears in commerce in America is derived entirely from natural deposits found on the shores of lakes in California and Nevada. The natural product is, of course, very impure, and has to be purified before it is marketable. Borax is soluble in twelve times its weight of water. Both borax and boric acid have been supposed to act as efficient germicides in strong solutions, but this has been proved incorrect. They are antiseptics, however, even when in weak solutions. In the form of a lotion boric acid has been used as a remedy for *erysipelas* with a good deal of success, and it may be similarly employed in *burns* and *scalds*. Borax may also be used as a wash in *diphtheria* and in *aphthous stomatitis*, *cancrum oris*, and *gangrenous stomatitis*. In the treatment of *pruritus ani* and *vulvæ* and in *bromidrosis* and *fœtid sweating* it is of great value when used as a wash. Strong solutions, locally applied, are useful in *tinea tonsurans* and *tinea circinata*.

The following makes a very useful application for the skin of the face and hands to prevent chapping:

℞.—Acid. boric.	ʒj (4.0).
Ceræ albæ	ʒj (4.0).
Paraffini	ʒij (8.0).
Ol. amygdalæ dulc.	fʒij (8.0).—M.

S.—To be thoroughly mixed and applied night and morning.

Boric acid may be given internally in *cystitis* to render the urine acid, and is useful in the removal of *freckles* when applied as a wash to the skin. In persons having an idiosyncrasy to boric acid a bullous eruption of the skin may follow its use.

Borax should not be used with glycerin, as an acid reaction is apt to occur.

A very useful wash for oral and nasal mucous membranes is "Dobell's solution," which is composed of—

℞.—Sodii boratis Sodii bicarbonatis	āā ʒj (4.0).
Acid. carbolici	gr. xxx (2.0).
Glycerini	f℥j (32.0).
Aquæ puræ	Oij (1 litre).—M.

Boric acid (*Acidum Boricum, U. S.* and *B. P.*) is one of the most commonly used substances in eye-washes, either alone or with cocaine. When used with cocaine or other drugs it is employed to prevent the destruction of the alkaloid or glucoside, as the case may be, by the growth of mould. The following formula may be employed:

℞.—Cocain. hydrochlor.	gr. iv vel viij (0.2–0.5).
Acid. boric.	gr. x vel xx (0.65–1.3).
Aquæ destillat.	f℥ij (64.0).—M.

S.—To be used by dropping into the eye in *conjunctivitis* and similar states.

Borax has been used very largely in the treatment of *epilepsy*, with asserted success in some cases. Its employment is purely empirical. The dose used is from 8 to 15 grains (0.5–1.0), gradually increased until it produces some disturbance in the alimentary canal. As the taste is very disagreeable to most persons, the drug should be used with liquorice, strong coffee, or syrup of bitter orange:

℞.—Sodii boratis	℥ss (16.0).
Glycerin.	f℥j (32.0).
Ext. glycyrrhiz. fl.	f℥ij (64.0).
Aquæ	q. s. ad f℥vj (128.0).—M.

S.—Dessertspoonful (8.0) in water after each meal.

If larger doses than 15 to 30 grains (1.0–2.0) a day are used after the convulsions are decreased in number, there are two difficulties: 1st, that the good effect is rapidly lost; and, 2d, that untoward symptoms, such as nausea and diarrhœa, with emaciation and the formation of a scarlatinal, eczematous, or papular eruption, appear. A peculiarity of the last two eruptions is that they are distributed around the joints.

Borated lint is made by dipping lint into a boiling saturated solution of boric acid or borax. It makes a simple, inexpensive antiseptic surgical dressing, and contains nearly one-half its weight of the drug. *Glycerinum Boracis, B. P.*, and *Mel Boracis, B. P.*, are not official in the *U. S. P.*, but are used as local applications for chapped hands and small sores.

BOROGLYCERIN.

Boroglycerin is a liquid made by mixing 62 parts of boric acid with 92 parts of glycerin in a tarred porcelain capsule at a temperature of not more than 302° F. The acid is added to the glycerin gradually, with constant stirring. When the mixture has been reduced to the weight of 100 parts, it is poured on a flat surface wet slightly with petroleum, and on hardening is cut into blocks, which should be placed at once in a well-stoppered bottle. When used for medicinal purposes the glycerite of boroglycerin (*Glyceritum Boroglycerini, U. S.*) should be employed, which may be made by adding 1 ounce (32.) of the boroglycerin in solid form to 1 ounce (32.) of glycerin and heating in a dish while stirring. It is soluble in water. Locally the glycerite of boroglycerin is used as an antiseptic and as a vehicle for carbolic acid, chrysarobin, and the vegetable alkaloids in the treatment of skin diseases, and in diseases of the eye, such as *purulent ophthalmia.*

BROMIDES.

Bromides of Potassium, Sodium, Lithium, Calcium, Gold, Nickel and Ammonium, and Hydrobromic Acid.

Bromide of Potassium.

Bromide of Potassium (*Potassii Bromidum*, *U. S.* and *B. P.*) is the most commonly used and important member of the group above named, and will, therefore, be spoken of before the others.

It is prepared by precipitating freshly-made bromide of iron with pure carbonate of potassium, or by a process more readily carried out and recommended by the *B. P.* It occurs in colorless transparent crystals, which are stable in dry air, but absorb moisture in a damp atmosphere. It is very soluble in water, but less so in alcohol. This bromide has a salty taste, and is distinctly irritant to mucous membranes if locally applied in concentrated form. A certain portion of its depressant influence, particularly when it is given for long periods of time, depends upon the potassium as much as upon the bromine, and for this reason the sodium salt is preferable.

Physiological Action.—Bromide of potassium has an action upon the animal economy which is clearly defined and closely followed by all the other bromide salts, so that what is said in this place concerning its effects may be taken as representing the whole class of bromides, except in the instances where slight differences exist, which will be pointed out under the various names of the respective salts.

Bromide of potassium when taken internally produces drowsiness, stupidity, sleep, and a decrease of all the reflexes. (See Effects of Prolonged Use.)

NERVOUS SYSTEM.—The bromide of potassium acts as a distinct depressant to the motor and intellectual portions of the cortex cerebri. It slows the development of thought and decreases the excitability and power of the motor cells of the brain (Albertoni). Upon the spinal cord it acts as a marked sedative, affecting chiefly the sensory tracts, and causing thereby loss of reflex action and a decrease in the ability of the animal to recognize pain. It also depresses to a less extent the motor pathways in the cord. Motion is maintained after sensations to pain and reflexes are lost. The drug depresses the peripheral parts of the sensory nerves, and in very large doses the motor nerves and muscles are similarly involved.

CIRCULATION.—If the drug be injected in ordinary dose into the jugular vein, it causes at once a fall of arterial pressure and pulse-rate. These changes are due to a direct action of the bromine and the potassium upon the heart. When given to man in therapeutic doses by the mouth, its circulatory effect is so slight as not to be worthy of consideration unless the dose is large and repeated.

RESPIRATION.—Bromide of potassium is a depressant to the respiratory centre in toxic dose. In medicinal dose it does not affect the breathing, except when the amounts given are large and the drug persistently administered, when the breathing becomes slower.

DIGESTION.—The bromides may disorder the stomach by irritating its mucous membrane or by so decreasing reflex action that the proper secretion of gastric juice and digestion does not take place with sufficient rapidity. For similar reasons they may cause constipation. The hydrochloric acid of the gastric juices sets free the bromine.

TEMPERATURE.—No effect upon this function is noted unless the dose be enormous: when such a dose is given the bodily heat is progressively diminished, the fall of temperature being probably due to the circulatory and nervous depression produced, associated with the general failure in vital power.

ELIMINATION.—The drug escapes unchanged very slowly with all the secretions, and is found in the sweat, urine, tears, semen, milk, and fæces.

Tissue-waste is decreased when the animal economy is under the influence of one of the bromides.

Therapeutics.—From what has been already said, it is evident that bromide of potassium is a remedy to be devoted almost entirely to the treatment of diseases of the nervous system, and its uses are, therefore, as various as the manifestations of perversion of nervous action can be various. In a word, it may be said that bromide of potassium is to be used wherever *over-excitement of nervous protoplasm* is present, but never where nervous symptoms are due to depression.

In *epilepsy*, which, to the best of our knowledge, is due to explosive impulses arising in the cerebral cortex, it is the best drug we have, and in all forms of minor spasm, due to heightened reflex activity, it is of service. Care should be used in giving this drug in this disease, that maniacal excitement does not supplant the attacks of epilepsy. (See Epilepsy, Part IV.) In *spasmodic contractions*, in the treatment of *hysterical females*, in *nervous startings* and alarm at sudden noises in adults and children, and in the nervous symptoms accompanying *pregnancy* and the *menopause* the bromides will be found of great value. The following prescription was recommended very highly by Goodell, and will be found of service in these states:

℞.—Ammonii bromidi . . . . ʒij (8.0).
Potassii bromidi . . . . ʒiv (16.0).
Spts. ammon. aromat. . . . . fʒvj (24.0).
Aquæ camphoræ . . . . q. s. ad f℥vj (192.0).—M.
S.—A dessertspoonful (8.0) to a tablespoonful (16.0) every four hours.

In *headaches* due to uterine trouble the pain is often felt at the top of the skull or at the back of the neck near the occiput. The cause of this trouble will sometimes be found to be in the *cervix uteri*, and relief under these circumstances can only be obtained when the uterus is treated and the bromides administered.

In *convulsions* in children and adults, combined with chloral, bromides are most efficient, and are sometimes of service in *incontinence of urine* due to vesical spasm. In *seminal emissions* due to a morbid excitability of the centres in the spinal cord bromide of potassium is one of the best remedies we have, and in *satyriasis* and *nymphomania* it is of great service.

In cases where undue *irritability of the pharynx* and larynx prevents examination of these parts, one or two full doses will render an examination easy of performance by decreasing the local reflex activity. This is a useful point to be remembered in relation to the treatment of pharyngeal and laryngeal disease.

In cases of *acute laryngitis* full doses of the bromides (60 to 120 grains [4.0–8.0] a day) are very useful.

The bromides are found to be of service in the *laryngeal crises* of locomotor ataxia, the explanation of this fact being as follows: The adductor centre of the larynx is situated in the brain, and the abductor centre in the spinal cord. The first closes the larynx, the second opens it, and in health they maintain a patulous tube by their opposition. In disease the spinal centre (the abductor or opener) fails, and the adductor in the brain being unopposed, produces closure of the tube with disastrous results. The bromide, by quieting reflex action, as well as depressing the adductor centre in the cerebral cortex, prevents this accident.

In *whooping cough* with much mucous exudation the drug is rarely of benefit, and had better not be used. In *laryngismus stridulus* or any form of spasm depending upon local irritation the local trouble must, of course, be removed if possible. In *teething* the drug may be used to decrease reflex irritation and prevent convulsions, and it will decrease the *night-screaming* of children—which is often due to bad dreams—to a very extraordinary degree, even if the dose be quite small. As a soporific for the insane and in the *insomnia* of the overworked and that of nervous women the bromide of potassium is of great service. It may also be employed with good results in *chronic alcoholism* and *morphiomania*. In *migraine* and *neuralgia* due to eye-strain or other nerve-strain, combined with caffeine the bromide is almost a specific. The caffeine seems to stimulate the depressed nerve up to the normal level, and the bromide to deaden the perception of the pain. The following is a most valuable remedy in migraine, and even in sick headache. It ought not to be used in bilious headache, which will often be made worse by it:

℞.—Antipyrini	gr. xxv (1.65).
Caffeinæ citratæ	gr. x (0.65).
Potassii bromidi	gr. xxv (1.65).—M.

Ft. in chart No. v.
S.—One powder as needed

In the treatment of *dysmenorrhœa* and *menorrhagia*, particularly in young subjects, the bromides are also of service. (See Dr. Goodell's prescription just given.) When the flow is too great at such a period, the drug should be begun a week before the expected epoch, and kept up in the dose of 5 to 10 grains (0.3–0.65) night and morning. In cases where the epochs follow one another too closely the drug should be used continuously. After an apparent cure ensues the bromide should be used for a few periods to avoid a relapse. For *sea-sickness* the bromides are the best prophylactics we possess, and should be used in the dose of 5 to 10 grains (0.3–0.65) three times a day for several days before the patient sails in order to quiet the vomiting centre. After sea-sickness begins they should not be given in ordinary solution, but in an effervescing draught made as follows:

℞.—Acid. citric. . . . . ʒij (8.0).
Aquæ dest. . . . . f℥iv (128.0).—M.
Ft. sol.

℞.—Potassii bromidi . . . . ʒj (4.0).
Potassii bicarbonatis . . . . ʒj (4.0).
Aquæ dest. . . . . f℥iv (128.0).—M.
Ft. sol.
S.—A tablespoonful (16.0) of each of these solutions should be added to one another and taken during effervescence.

This prescription will also be found of value in the persistent *vomiting of pregnancy* and in that following prolonged etherization or other states. If the vomiting is excessive, the dose ought to be reduced to 2 teaspoonfuls (8.0) of each solution, and be given every half-hour until half of each mixture is taken or the patient is relieved. In cases where this will not act rectal injections of the following will be found of value:

℞.—Potassii bromidi . . . . gr. xxx (2.0).
Tinct. opii deodorat. . . . . gtt. xxx (2.0).
Aquæ amyli . . . . f℥vj (192.0).—M.
S.—To be injected gently into the empty rectum and retained as long as possible.

This method is the most reliable plan that can be followed.

Bromide of potassium may be used to prevent the symptoms of *cinchonism* after the use of quinine and salicylic acid, and it is said to prevent the nausea and depression so apt to follow the use of opium.

Administration.—The dose of bromide of potassium is from 5 to 120 grains (0.3–8.0) a day.

Use of Bromides in Poisoning.—Bromides are useful in all convulsive attacks consequent upon the ingestion of poisons, except those due to cardiac sedatives which depress the circulation at the base of the brain, and they may be used to allay any nervous symptoms which are of an excited nature, to prevent excessive vomiting, to produce sleep, and to quiet delirium, and even to allay pain.

Poisoning.—Acute poisoning by the bromides is rare, but if half to one ounce is taken they produce a warmth in the epigastrium, general feebleness, frontal headache, stupidity, aphasia, and amnesia. The pulse-rate falls from 15 to 20 beats; the pulse is irregular and compressible. Recovery takes place, as a rule, unless pulmonary œdema sets in.

Effects of Prolonged Use, or Bromism.—After the drug has been used for some time acne appears about the face and extends over the entire body; the breath becomes fœtid, the patient dull, expressionless, and heavy, remaining buried in sleep during nearly every hour of the day. During this time he can be aroused, but at once falls to sleep again. The walk becomes weak and feeble, the movements slow and painfully prolonged. Taste is lost and hearing is benumbed, while the intellectual faculties of the brain are almost blank. Loss of sexual power is an early symptom. In other cases evidences of mental aberration develop, the patient becoming irritable, morose, and even homicidal. Sometimes, however, we find melancholia and hallucinations, and rarely exalted ideas. In still others a dangerous suffocative bronchitis develops, the patient may become profoundly cachectic, or the condition may resemble typhoid fever. The acne may be put aside by the use of arsenic, and where bromides are used to any extent in women this drug should always be given simultaneously to prevent the eruption. As Fowler's solution is compatible with the bromide in solution, so it is the best form of arsenic to employ. As the acne is due to a torpid state of the skin-glands, it is also well in these cases to order the patient to wash with warm water and castile soap every night, and afterward to dry the face by a good rubbing with a rough towel. Feré has recently asserted that the maintenance of intestinal antisepsis by the use of naphtol or salol will prevent the development of acne and digestive disorder when the bromides are given.

Contraindications.—The bromides are contraindicated wherever there is general asthenia and feebleness of the nervous system, as, for example, in post-typhoidal and post-puerperal insanity. In senile softening of the brain they are also harmful. When the mucous membrane of the gastro-intestinal tract is irritated, they do harm.

Bromide of Ammonium.

(See Ammonium Bromide.)

Bromide of Calcium.

Calcium Bromide (*Calcii Bromidum, U. S.*) was introduced into medicine as a nervous sedative and hypnotic, and was thought at one time to be an efficient substitute for the bromide of potassium. Its action on the nervous system is virtually identical with that of the potassium salt, and it has been found to be far less irritant and depressant than the latter. For some unknown reason it has never won the confidence of the profession, but it may be given with very good results in the dose of from 30 to 90 grains (2.0–6.0) a day, or even more in cases which are not readily affected by bromides. It is employed especially in *hysteria* and *epilepsy* and in all the conditions in which the other bromide salts are indicated. It is sometimes of value combined with the potassium salt, since under such circumstances better results are gained than if a single salt is employed.

Bromide of Gold.

The Bromide of Gold has been employed in *epilepsy* by a number of clinicians with great success in the dose of from $\frac{1}{5}$ to $\frac{1}{2}$ grain (0.015–0.03) three times a day in pills. Physiological studies have proved that the drug is a direct sedative to the motor cells in the cortex cerebri.

Bromide of Lithium.

Bromide of Lithium (*Lithii Bromidum, U. S.*). This salt is much weaker than the other salts, and must be given in larger dose. Dr.

S. Weir Mitchell states that it is of value in epilepsy after the potassium salt fails. The dose is 30 to 90 grains (2.0–6.0) a day.

Bromide of Nickel.

This is a green salt quite irritant to the stomach. The author has made an experimental study of the bromide of nickel, and found it practically identical with the bromide of potassium in physiological action. It should be given well diluted or in an effervescing draught, as it is apt to disorder the stomach if used in concentrated solution. The effervescing form of the drug is made by mixing the salt with bicarbonate of sodium and tartaric acid, moistening with alcohol, passing the moist powder through a sieve, and then drying it in a warm closet.

Bromide of Sodium.

Bromide of Sodium (*Sodii Bromidum, U. S.* and *B. P.*). This salt is to be used in every instance where bromide of potassium can be employed. Its dose is the same, although it is asserted to be a little weaker physiologically, grain for grain, than the potassium salt. It is far less apt to disorder the stomach, and is not so generally depressant as is the bromide of potassium.

Hydrobromic Acid.

Hydrobromic Acid is an extremely irritant preparation, but is thought to be less apt to cause acne and other untoward effects than the other bromides. It is only to be used in the form of the official dilute acid (*Acidum Hydrobromicum Dilutum, U. S.* and *B. P.*), and to be given in the dose of from 1 drachm to ½ an ounce (4.0–16.0) well diluted with sweetened water. It is highly recommended by de Schweinitz and others for *headaches* due to eye-strain in nervous women.

BROMIDE OF ETHYL.

(See Ethyl Bromide.)

BROMIDE OF STRONTIUM.

(See Strontium.)

BROMINE.

Bromine (*U. S.* and *B. P.*) is a dark-red liquid of an excessively pungent odor, like that of chlorine, possessing very extraordinary power as a caustic when applied to the tissues of the body. It is the most severe caustic we possess, and penetrates very deeply. It may be applied in *hospital gangrene* and other large *sloughs* by means of a glass-rod. Bromine should be kept in glass-stoppered bottles in a cool place.

BROMOFORM.

Bromoform, or Tribromomethane, is a clear, colorless liquid having a peculiar odor and sweet taste. It is readily soluble in alcohol, but slightly so in water. Bromoform, which is to be used medicinally, should be protected from sunlight and air, and must be free from color and from acid.

Therapeutics.—Although bromoform has been found capable of producing anæsthesia when given by inhalation, its employment in medicine is practically confined to the treatment of *whooping cough*, when it is given internally in the dose of 2 to 5 drops (0.1–0.3) three times a day for the relief of the spasmodic cough. Bedford has suggested the following formula for its internal use:

℞.—Bromoform. . . . . ♏xvj (1.0).
Alcohol . . . . fʒij (8.0).
Glycerin. . . . . fʒxij (48.0).
Tinct. cardamomi comp. . . . q. s. ad f℥ij (64.0).—M.
S.—Teaspoonful (4.0) t. d. in water.

This prescription should be put up by adding the ingredients in the order named.

Bromoform tends to depress the vasomotor system, but does not seem to depress the heart itself.

BRYONIA, or BRYONY.

This is a remedy very largely used by irregular physicians, but which nevertheless possesses very great power, and often relieves conditions which are obstinately persistent under other treatment. It is the root of *Bryonia alba* or *Bryonia dioica* (*U. S.*). The only official preparation is the tincture (*Tinctura Bryoniæ*, *U. S.*). The dose of the powdered root as a drastic is 10 to 40 grains (0.6–2.4).

Physiological Action.—In overdoses bryonia acts as a hydragogue cathartic and gastro-intestinal irritant. On serous membranes it exercises an irritant influence, and may produce symptoms of meningitis when given in poisonous doses. In moderate doses bryonia may cause some flushing of the face and neck and headache in susceptible persons. The drug needs studying from a physiological point of view.

Therapeutics.—Although one of the oldest of remedies, bryonia has been given a new impetus by the homœopaths, who employ it in a number of affections. In the treatment of *dyspepsia* depending upon gastric and intestinal atony or the abuse of alcohol or other similar causes bryonia often gives relief. Its influence is exerted through the irritant effects it produces, for by this means it stimulates or spurs the atonic digestive glands to increased activity. For this reason it has been found to be particularly useful in children who suffer from *constipation* resulting from insufficient secretion on the part of the intestinal glands. When the passages are dry and friable and resemble those of a dog in character, bryonia is of great value. The drug has been praised as a remedy in the treatment of rheumatism and in pleurisy, but little is recorded as to its real value in these diseases. It is probably always more effective when the febrile stages of these affections have passed by. Thus in pleurisy it is useless during the acute, forming stage, but prevents the pouring out of effusions, and if they be already poured out aids in their absorption.

Administration.—The dose of the tincture of bryonia (*Tinctura Bryoniæ, U. S.*) is from 1 to 2 fluidrachms (4.0–8.0) as a laxative, but the so-called mother-tincture of the homœopaths is perhaps the best preparation for ordinary use. The proper amount to be used in the treatment of a case of dyspepsia is from 5 to 40 drops (0.3–2.4) unless the mucous membranes are very torpid, when this quantity may be increased. In pleurisy with effusion drastic doses may be needed, but the saline purgatives are safer and more efficacious.

BUCHU.

Buchu (*U. S.*) is derived from *Barosma betulina*, a plant of Africa. It contains a volatile oil, which is probably the active principle, and a bitter extractive. It is official, under the name of *Buchu Folia*, in the *B. P.*

Therapeutics.—Buchu is used as a diuretic when it is desired to affect the mucous membranes of the genito-urinary tract which are chronically diseased, and particularly when these parts are below their normal tone. It does not increase the urinary flow to any great extent, but acts on the genito-urinary passages as a stimulant. It is useful in *pyelitis*, *cystitis*, and *vesical irritation* of a chronic type. The following prescription is useful:

℞.—Potassii citratis . . . . ʒiv (16.0).
Spt. chloroformi . . . . fʒiij (12.0).
Tinct. digitalis . . . . fʒj (4.0).
Infusi buchu . . . . q. s. ad f℥viij (256.0).—M.
S.—Two tablespoonfuls (32.0) three times a day.

If the urine is continually highly acid, muddy, laden with salts, and productive of incontinence by reason of the vesical irritation which it produces, buchu in the form of the fluid extract, in the dose of a teaspoonful (4.0) three times a day, combined with an equal amount of sweet spirit of nitre, will be of great service. For a child the dose of the fluid extract should be about 10 to 30 minims (0.6–2.0). If the vesical irritation is acute, buchu is contraindicated.

Administration.—The fluid extract (*Extractum Buchu Fluidum, U. S.*) is the only official preparation, and it should be always well diluted before it is given, in the dose, to an adult, of 1 drachm (4.0) three times a day. The infusion is not official, but is made by adding 1 ounce (32.0) of the leaves to a pint (500 cc.) of water. The dose of this is a tablespoonful (16.0) to two tablespoonfuls (32.0).

The official *B. P.* preparations are the infusion (*Infusum Buchu*), dose 1 to 4 fluidounces (32.0–128.0), and the tincture (*Tinctura Buchu*), dose 1 to 2 fluidrachms (4.0–8.0).

CACTUS GRANDIFLORUS.

This is a plant of Mexico and the West Indies. There are other species possessing medicinal power, but the *Cactus grandiflorus* is the most active.

The drug is best given in the form of the tincture or the fluid extract made from the green plant.

Physiological Action.—This has been studied by Myers and Boinet and Teissier, who have found that the drug causes a distinct increase of arterial pressure, but does not slow the pulse, sometimes increasing its rapidity. Myers has also shown that the drug is a stimulant to the vasomotor centres and to the motor ganglia of the heart-muscle. Cactus grandiflorus also acts as a stimulant rather than a depressant to the spinal cord.

Therapeutics.—Cactus grandiflorus bids fair to prove itself a good substitute for digitalis in certain diseases of the circulatory apparatus such as cardiac *palpitation* and *weakness*. It has also been found very serviceable as a remedy in cardiac failure the result of *valvular disease*, but in all such cases seems to act best when added to some more powerful drug, such as digitalis, as it takes the part of an adjuvant. Cactus also acts well in some cases of *angina pectoris*.

Administration.—The dose of the tincture of cactus is 2 to 8 minims (0.1–0.4) and of the fluid extract 2 to 4 minims (0.1–0.2).

Untoward Effects.—It is claimed that these do not occur, and that the drug never produces a cumulative effect.

CAFFEA.

Caffeine (*Caffeina*, *U. S.* and *B. P.*) is an alkaloid derived from the berries of *Caffea Arabica*, which also contain, upon roasting, an empyreumatic oil, caffeol or caffeone. Caffeine is usually employed in medicine as caffeine and the citrated caffeine (*Caffeina Citrata*, *U. S.*), which is soluble in 75 parts of water.[1] Citrated caffeine is not regarded by chemists as a chemical compound; therefore citrate of caffeine is an incorrect term. It is soluble in 3 parts of water. If more water is added, it is partly precipitated, but when 25 parts are added it is redissolved. In the U. S. P. for 1890 another official preparation of caffeine, the *Caffeina Citrata Effervescens*, has been introduced as an agreeable preparation in cases of headache if combined with one of the bromides and antipyrin. The dose is from 1 to 4 drachms.

Physiological Action.—NERVOUS SYSTEM.—On the nervous system caffeine acts as a rapidly-acting stimulant, exerting its chief influence on the brain and spinal cord. By its cerebral effect it causes increased rapidity of thought, and by its influence on the spinal cord it increases reflex activity, and for this reason is said to make people "nervous." It is important to remember that it has no effect on brain protoplasm except to stimulate it, and that ultimately a brain driven along by caffeine breaks down by the concentration of its energy for the time being in one effort.

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[1] Theine, derived from tea, caffeine, the active principle of coffee, and the alkaloid of guarana from South America, are chemically identical. Much of the caffeine of commerce is really theine, although it is claimed that pure theine has a very different physiological action.

CIRCULATION.—Caffeine has been supposed to increase the pulse-rate and blood-pressure by stimulating the heart-muscle, but from recent studies in this country and abroad it would seem probable that these changes are indirectly produced and due solely to its stimulating action on the nervous system. Clinically, it certainly seems to raise the blood-pressure in almost every instance where it is used.

KIDNEYS, TISSUE-WASTE, AND ELIMINATION.—Caffeine increases diuresis by a direct stimulation of the secretory epithelium of the kidney, and therefore increases the amount of solids as well as of the liquids in the urine. Upon tissue-waste the drug acts as a depressant, and is therefore a conservator of the tissues. It is burnt up in the body.

RESPIRATION.—Caffeine acts as a powerful stimulant to the respiratory centre.

The empyreumatic oil, of which there is about one-half to one teaspoonful in each well-made breakfast cup of coffee, has no physiological effects. It is probably the cause of the "biliousness" sometimes produced by the habitual use of coffee, due to the faulty digestion of this oil, which is also apt to disorder the digestion if taken alone.

Therapeutics.—Caffeine is a valuable *cardiac stimulant* and tonic as well as a *renal stimulant.* It acts equally well in *cardiac* and *renal dropsies* for this reason, and is an invaluable remedy in such cases. In acute renal inflammation it is contraindicated, because all stimulants are contraindicated in acute inflammations. In *opium poisoning*, owing to its stimulant effect on the respiratory centre, it is very valuable. Under these circumstances it may be given in the form of strong black coffee, which will aid in keeping the patient awake and also add heat to the body, which is often very cold. A cup of strong black coffee is often useful in the treatment of a paroxysm of *asthma.* In *headache* due to nerve-strain caffeine combined with antipyrin and one of the bromides is of the greatest service. (See Neuralgia.) So useful is caffeine in cases of *cardiac disease* that it has largely supplanted digitalis in the hands of some practitioners.

Coffee is sometimes used to cover the taste of disagreeable medicine. In the form of roasted and ground coffee it is employed as an antiseptic and deodorant dressing for wounds where the common antiseptics are not obtainable.

Caffeina, *U. S.* and *B. P.*, cannot be used hypodermically, owing to its decomposition in the presence of water. The following solution may, however, be used hypodermically: Salicylate of sodium, 30 parts; caffeine, 40 parts; and distilled water, 60 parts; or, in other instances, the following preparation, recommended by Huchard, may be employed: Benzoate of sodium, 45 grains; caffeine, 30 grains; distilled water, 1½ drachms. This mixture is to be heated, and 10 drops given at a dose.

Untoward Effects.—Caffeine often produces so much insomnia when given in cardiac disease that it has to be discontinued. If its use is persisted in, it may produce a condition of delirium closely resembling that of alcoholism. The writer has also seen a marked rise of temperature follow its use in the dose of 2 grains (0.1) three times a day, but this is very unusual. In nervous persons coffee may cause insomnia, tremors, palpitation, tinnitus aurium, gastralgia, and emaciation.

CAJUPUT OIL.

Oil of Cajuput (*Oleum Cajuputi, U. S.* and *B. P.*) is a volatile oil distilled from *Melaleuca Leucodendron*, a tree of the Molucca Islands. It is a stimulant, and in large amounts an irritant, to mucous membranes, but acts as an efficient *carminative* and *parasiticide* in moderate amounts. As a remedy for *tinea tonsurans* and *pediculi* it should be applied pure to the part affected. Cajuput oil is capable of irritating the skin. In *diarrhœa* of a serous type it is of value in the dose of 10 to 20 drops (0.65–1.20). (See Diarrhœa.) *Spiritus Cajuputi* is official in the *B. P.;* dose ½ to 1 fluidrachm (2.0–4.0).

CALCIUM.

Calcium is official in a number of forms, and is to be distinctly separated in the mind of the student from calx or lime, which is an oxide of calcium. It is never employed as calcium, but as one of its salts. These are as follows: Bromide of calcium (*Calcii Bromidum, U. S.*); precipitated carbonate of calcium (*Calcii Carbonas Præcipitatus, U. S.; Calcii Carbonas Præcipitata, B. P.*); chloride of calcium (*Calcii Chloridum, U. S.* and *B. P.*); hypophosphite of calcium (*Calcii Hypophosphis, U. S.* and *B. P.*); and as precipitated phosphate of calcium (*Calcii Phosphas Præcipitatus, U. S.; Calcii Phosphas Præcipitata, B. P.*). Calcium sulphate is not official.

All salts of calcium are incompatible with acids.

The precipitated carbonate of calcium is used in the treatment of *serous diarrhœa* as an *antacid*, and as a *local protective* in cases of *chapped skin* or *intertrigo*, particularly in young children. When given internally the dose is from 10 to 30 grains (0.65–2.0), but by far the best method for its administration is in the employment of chalk mixture (*Mistura Cretæ, U. S.* and *B. P.*), which contains about 30 grains of the chalk to each ounce (2.0–32.0) of liquid. The dose of this mixture is from a teaspoonful (4.0) for a young child to an ounce (32.0) for an adult. In the treatment of cases of *diarrhœa* chalk mixture is best given in combination with tincture of kino or the compound tincture of catechu and paregoric, in some such form as follows:

℞.—Tr. kino . . . . f℥j (32.0).
Tr. catechu comp. . . . . fʒij (8.0).
Misturæ cretæ . . . . q. s. ad f℥vj (192.0).—M.
S.—A dessertspoonful (8.0) every three hours till diarrhœa ceases.

It is to be remembered that the chalk mixture acts very slightly as an astringent, and chiefly as an antacid and mechanical agent in the alimentary canal.

Precipitated carbonate of calcium is the slowest *antacid* which we possess, and for this reason is the remedy to be employed in acidity of the intestines, as it passes through the stomach to a very great extent unchanged. (For the varieties of diarrhœa in which it is to be used see article on Diarrhœa.) As an external application it is used in *sweating of the feet* and hands, and sometimes as a dry dressing to *ulcers*. It may also be used over *burns*.

Calcium chloride, when taken internally in any amount, acts as an intense gastro-intestinal irritant, and may produce death by this means. It is to be distinctly separated from the chlorinate or chloride of lime, with which it is sometimes confused, for the latter is nothing more than hydrate of lime or slaked lime, containing 25 per cent. of chlorine, while chloride of calcium is a hard, vitreous, friable substance, giving off no odor of chlorine and utterly different in its use, action, and appearance.

Chloride of calcium is used in medicine by some physicians in the treatment of *scrofulous enlargements of glands* in the neck and elsewhere, and is even said to cause calcification and encysting of *tubercular nodules*. In cases where *deficient bone-formation* is evident it often does good, but the other salts of lime, such as the lactophosphates, are better. In cases where *boils* mature slowly a poultice made by adding a solution of chloride of calcium to the mass may be used to hasten suppuration. The dose internally is 5 to 30 grains (0.65–2.0), best given in a solution made by adding water in the proportion of 1 drachm (4.0) to each 5 grains (0.3) of the drug.

Another use of calcium chloride which is one always worthy of trial is its employment in the treatment of *itching*. It should be given in the dose of 20 grains (1.5) three times a day to an adult, and may be prescribed as follows:

℞.—Calcii chloridi . . . . ʒij (8.0).
Tinct. aurantii florum . . . . fʒvj (20.0).
Aquæ chloroformi . . . . . . q. s. ad ℥vj (180.0).—M.
S.—One to 2 tablespoonsfuls (15.–30.) three times a day.

Smaller doses may be needed if the stomach is irritable. These doses usually produce some thirst, and they should be taken about one hour after a meal.

Small doses of calcium chloride have also been used to increase the coagulability of the blood in "bleeders," and to prevent attacks of urticaria by an influence on the blood-plasma.

The hypophosphite of calcium and the precipitated phosphate of calcium are used for the treatment of scrofulosis or strumous states and allied conditions, such as rachitis, generally in the form of the *Syrupus Hypophosphitum, U. S.*, and the *Syrupus Calcii Lactophosphatis, U. S.*

The large amount of phosphate of calcium in the bones and tissues renders it a useful drug when the body is starved of its proper proportions of salts, and its use has been found, in animals, to cause a great increase in bony growth, not only in the earthy, but also in the animal, constituents of the osseous tissues. The hypophosphite has a similar effect.

In *rickets* and in *fractures* where the bone is slow in uniting, and in some cases of *phthisis* and *scrofula*, the lactophosphates and hypophosphites are of service. It is worthy of note that they are of little value in tuberculosis after it is really well developed. They do good chiefly in the so-called pre-tubercular or beginning stages of the disease. In *dental caries*, particularly that occurring in nursing women, and in the *anæmia* of this class of patients, they are useful. In *general debility* and *nervous prostration* they are often of great value, and may be even used with benefit in chronic and atonic diseases of the skin and mucous membranes. In cases of *hepatic torpor* they may be employed with advantage.

The lactophosphates are better than the hypophosphites, as the latter are probably changed into phosphates in the stomach as soon as they enter that viscus. The only advantage which they possess over phosphorus in certain diseases, particularly those of the bony system, is that they afford an easy method of administration, and also that they contain calcium. The dose of either of these two drugs is 10 to 30 grains (0.65–2.0) three times a day, or of the syrups just named a teaspoonful to a tablespoonful (4.0–15.0). The difference between these salts and phosphorus, both in therapeutical effect and physiological action, is to be clearly borne in mind. The lactophosphates and hypophosphites are simply convenient modes of administering calcium, potassium, or other substances, while phosphorus acts as a stimulant to bone-growth and not by its deposition in the bone. Phosphoric acid does not act any more like phosphorus than does sulphuric acid act like sulphur.

Sulphate of calcium is not to be confounded with sulphide of calcium, or, to speak more correctly, calx sulphurata. Very often failure attends the use of this remedy, because the calx sulphurata has undergone oxidation and is calx sulphate. (See Boils and Calx.)

Chalk.

Chalk is a native calcium carbonate chiefly obtained from shells.

Prepared chalk (*Creta Præparata, U. S.* and *B. P.*) is given in the dose of 20 to 60 grains (1.3–4.0). Other preparations are compound chalk powder (*Pulvis Cretæ Compositus, U. S.*), composed of prepared chalk, acacia, and sugar, and given in the dose of 10 to 60 grains (0.65–4.0), and troches of chalk (*Trochisci Cretæ, U. S.*). Preparations official in the *B. P.*, but not in the *U. S. P.*, are aromatic powder of chalk (*Pulvis Cretæ Aromaticus*), dose 10 to 60 grains (0.65–

4.0), and *Pulvis Cretæ Aromaticus cum Opio*, dose 10 to 60 grains (0.65–4.0).

CALUMBA.

Calumba, Columbo, or Columba, is the root of the *Jateorrhiza Palmata*. Its taste is bitter and its odor is slightly aromatic. Two alkaloids are found in it, berberine and columbine, and a third substance known as columbic acid. Calumba is one of the purest bitters known.

Therapeutics.—Calumba is one of the best simple tonics which can be used, owing to its lack of astringent effect and to its favorable action on mucous membranes.

In cases of *gastro-intestinal atony*, particularly that following fevers and similar states, calumba will be found of service, and it is a valuable remedy in the convalescent stages of *summer complaint* and *serous diarrhœas*. The following prescription of Dr. George B. Wood is very useful in these states when they are associated with flatulence:

℞.—Calumbæ pulv.	℥ss (16.0).
Zingiberis pulv.	℥ss (16.0).
Sennæ fol.	ʒj (4.0).
Aquæ bullientis	Oj (500 cc.).—M.

Ft. in infusum.
S.—A wineglassful t. d.

Administration.—The fluid extract (*Extractum Calumbæ Fluidum, U. S.*) is given in the dose of 15 to 60 minims (1.0–4.0); the tincture (*Tinctura Calumbæ, U. S.*), dose 1 to 4 fluidrachms (4.0–16.0). The dose of the extract (*Extractum Calumbæ, B. P.*) is 2 to 10 grains (0.1–0.65); the infusion (*Infusum Calumbæ, B. P.*), 1 to 2 fluidounces (32.0–64.0); and the tincture (*Tinctura Calumbæ, B. P.*), ½ to 2 fluidrachms (2.0–8.0).

CALX.

Calx, or Lime, or Oxide of Calcium, is an alkaline earth which is incompatible with acids, ammoniacal and metallic bases, borates, alkaline carbonates, and astringent vegetable infusions. It is prepared by burning pure white marble, oyster-shells, or the purest calcium carbonate.

Therapeutics.—Lime is used for the purpose of acting as an escharotic, particularly on *old ulcers* and on *hairy growths*. It is never given internally except in the form of the hydrate or slaked lime. As an escharotic application lime is used in the official caustic *Potassa cum Calce, U. S.* When given internally it should always be used as *Liquor Calcis, U. S.* and *B. P.*, or lime-water, and under these circumstances it acts as an *antacid*, as an aid to the digestion of milk by preventing too rapid and solid coagulation of the casein, and by exciting an increased gastric secretion. It is also feebly astringent. Given to infants and nursing women, it is probably utilized in the body in the formation of bone. It is also of value in *diabetes*, in the *uric-acid diathesis*, and in the excessive *nausea* and *vomiting* very often seen in adults and children. Teaspoonful doses of milk and lime-water, equal parts, will often be retained when nothing else will remain in the stomach.

The dose of lime-water is a teaspoonful (4.0) to 1 ounce or even 2 ounces (32.0–64.0). Externally applied, lime-water is of value in *tinea capitis* and similar states, and it is the best application in *burns*, when it is to be mixed with equal parts of linseed or olive oil, forming the *Linimentum Calcis*, *U. S.* and *B. P.*, or carron oil. As a local application in *membranous croup* and *diphtheria* lime-water has a high reputation, and is believed to dissolve the membrane. It may be used as a spray or by means of a swab.

Liquor Calcis, or lime-water, is to be made by adding a piece of unslaked lime as large as a walnut to 2 quarts of boiled and filtered water in an earthen jar; after stirring it thoroughly allow it to settle, and pour off the clear liquid into a bottle. More water may then be added to the lime until it is all used.

Sulphurated lime (*Calx Sulphurata*, *U. S.* and *B. P.*) is useful to check inflammation and hasten suppuration; the dose is $\frac{1}{10}$ of a grain (0.006). It is of value in *acne pustulosa* and all forms of suppuration in the skin. Where sulphurate of lime is not obtainable and successive crops of boils constantly appear, it is often possible to relieve the patient by baking egg-shells in an oven, powdering them, and then letting the patient eat 1 drachm (4.0) or more of the powder each day.

The preparations of the *B. P.* that are not official in the *U. S.* are the saccharated solution of lime (*Liquor Calcis Saccharatus*), dose 15 to 60 minims (1.0–4.0), and slaked lime (*Calcii Hydras*), used in different preparations.

(For Calx Chlorata see Chlorinated Lime.)

CAMPHOR.

Camphor (*Camphora*, *U. S.* and *B. P.*) is derived from the *Cinnamomum Camphora*, which grows chiefly in China and Japan. The camphor used in the drug-stores is in reality refined camphor, and is so obtained by repeated sublimation. It is a volatile, irritant stearopten, producing a burning taste and possessing a peculiar odor, soluble in 1000 parts of cold water and in 1 part of strong alcohol. Camphor is so volatile that if allowed to remain exposed to the air for any length of time it rapidly loses its bulk and eventually disappears. It is an exceedingly combustible substance, burning with a flame and much smoke. It may be white or pinkish in color.

Physiological Action.—If taken in large amount, camphor produces epileptiform convulsions, preceded by vertigo, roaring in the ears, and delirium. The pulse soon becomes rapid, feeble, and running, and the skin livid, cold, and covered with sweat. Great heat and burning may be felt in the belly, and, if the poisoning be slow, evidences of gastro-intestinal and renal inflammation ensue. In small doses it acts as a stimulant and adds a sensation of warmth to the stomach, while the pulse may become more rapid and stronger under its influence. At the same time there is a sedation of the nervous system and a general feeling of contentment. In large medicinal dose camphor is thought by some to act as a sexual stimulant, and by others as a sexual sedative. The stimulant effect is probably only produced by doses large enough to produce irritation of the genito-urinary tract. The convulsions following poisonous doses are cerebral in origin. The drug, although largely destroyed in the body, is eliminated by the kidneys as campho-glycuric acid, and also escapes by the breath and the perspiration.

Therapeutics.—INTERNAL USE.—Camphor is employed for the purpose of acting as a *nervous sedative* and *antispasmodic* in the treatment of nervous women and children, and as a *carminative* in persons who suffer from *intestinal flatulence*. It is of value in nervous *dysmenorrhœa* and *headache*, and is best combined with one of the new analgesics, such as antipyrin and acetanilid given in pill form. As it is virtually a volatile oil so far as its physiological action is concerned, it will be found useful in *cholera morbus* and all forms of *serous diarrhœa*, but rarely in mucous diarrhœa. (See Diarrhœa.) In *chordee*, combined with bromides and similar depressants to the spinal cord, camphor is of great service in some cases, particularly late in the disease. In *adynamic fevers* it has been used as a diffusible stimulant by Graves and others with great success. Camphor is a very useful remedy in cases of *sudden nervous depression*. It may be given by the mouth or, if the emergency is a pressing one, by hypodermic injection. Under these circumstances it is best given in the form of camphorated oil in the strength of 1 part of camphor to 9 of sweet oil, which last should be perfectly sterile. The dose of this solution is 15 minims (1.0). When used in the nervous depression of phthisis, Alexander asserts that its continuous injection may result in cumulative action and develop the symptoms of mild camphor poisoning. In *hiccough* it is of great service, and in *cardiac palpitation* due to functional irritability it is found to be of value. In *capillary bronchitis* and *catarrh* of the air-passages it will be found useful in old or atonic cases. In *chronic nasal catarrh* spirits of camphor when inhaled from the neck of a vial gives off enough of the drug to start up secretion and tone up the parts. It is also of value as a *mouth-wash* in persons who have fœtid breath.

Camphor may be inhaled or taken internally in cases of *cold in the head* with great relief and a decided influence in aborting the attack. The following formula may be employed :

R.—Camphoræ	gr. ij (0.12).
Ext. belladonnæ fl.	♏jss (0.09).
Quininæ sulph.	gr. ij (0.12).—M.

Ft. tabellæ No. x.

S.—One every hour for four or five doses.

After the attack is in full force this is useless, but used early it will decrease the *frontal headache* and the *sneezing* and running at the nose. In *coryza* from unknown causes with much lachrymation and incessant sneezing, camphor will be found of benefit. It may be snuffed up the nostril in a fine powder, or powdered camphor may be put in boiling water and the fumes inhaled. The spirit may also be inhaled from a handkerchief.

EXTERNAL USE.—Externally camphor may be used as a stimulant to *indolent sores* and as a useful addition in small amount to the precipitated carbonate of calcium as a dusting-power in *intertrigo*. In the form of a liniment camphor is used over *inflamed joints* from *sprains* or *rheumatism*, and in *myalgia* and *neuralgia* to relieve the pain and stiffness.

Camphorated alcohol, spirit of camphor, is a useful application for abortive purposes when used over *boils* in their early stages, if repeated two or three times a day for a few moments at a time. Following these applications, the skin should be dried and camphorated oil applied. Ringer and Tilt both recommend that Eau de Cologne, saturated with camphor, be rubbed into the head in the *drowsiness and headache of the menopause*, and a lotion of equal parts of aqua ammonia and spirit of camphor dabbed on the painful or hyperæsthesic spots at the top of the head, so commonly felt by nervous women at the change of life or during menstruation, will be found to give relief.

Administration.—Camphor is used internally in the form of the camphor-water (*Aqua Camphoræ*, *U. S.* and *B. P.*), dose ½ to 2 fluidounces (16.–64.); the spirit of camphor (*Spiritus Camphoræ*, *U. S.* and *B. P.*), dose ½ a fluidrachm (2.0), or in the form of the camphor itself, in pill, in the dose of 1 to 3 grains (0.05–0.15) in each pill. The best preparation for internal use is the spirit, or the camphor itself may be given.

For external use we have, official, the camphor liniment (*Linimentum Camphoræ*, *U. S.* and *B. P.*) and the soap liniment, or *Linimentum Saponis*, *U. S.* and *B. P.*, which is the mildest of the two. *Ceratum Camphoræ* is also official. A compound tincture of camphor (*Tinctura Camphoræ Composita*), composed of opium, benzoic acid, camphor, and oil of anise, is official in the *B. P.*, dose 15 minims to 1 fluidrachm (1.0–4.0). *Linimentum Camphoræ Compositum*, *B. P.*, is composed of camphor, rectified spirit, and stronger ammonia.

CAMPHOR MONOBROMATE.

Monobromated Camphor (*Camphora monobromata*, *U. S.*) is made by heating together in a sealed tube camphor and bromine. It occurs in colorless crystals or scales, and has a mild taste resembling camphor. It is almost entirely insoluble in water, but is freely soluble in alcohol, ether, and chloroform.

Physiological Action.—Monobromated camphor possesses powers partaking of the bromides and of camphor. In the frog it causes loss of reflex action, motor palsy and death by respiratory failure, and in warm-blooded animals violent convulsions, Cheyne-Stokes respirations, muscular tremblings, and weakness. The pulse is at first more rapid than normal, then slow and weak, death coming in coma or during the convulsions.

Therapeutics.—Monobromated camphor will generally be found most useful for pain when combined with other drugs, particularly in *lumbago*, or the pain due to nervous disturbances. If used in *hysterical females*, it will often produce sleep, and is of value to those who are addicted to the alcohol-habit, as it acts as a hypnotic and warms the stomach. Like camphor itself, it is a gastric irritant, and should not be employed where gastritis exists. It has been used in *spermatorrhœa* with great success, and in *delirium tremens* has been found of benefit in cases where the gastric mucous membrane is depressed and the nervous twitchings are troublesome. In *whooping cough* it may be tried, and it has even been used in *chorea*, *epilepsy*, and *petit mal*. In the nervous depression and pains of epidemic influenza monobromated camphor has been largely used. (See Acetanilid.)

Administration.—It should never be used hypodermically, as it is too irritating, but administered in the dose of 5 grains (0.35) three times a day in pill, or in an emulsion made by dissolving it in six times its weight of expressed oil of almonds and then forming an emulsion with gum arabic and water in the usual manner.

CAMPHORIC ACID.

Camphoric Acid is made by the oxidation of camphor through the influence of acids, and has been used in the *night-sweats of phthisis* with great success. In a large number of cases suffering from night-sweats the author has found this drug to act very favorably indeed where other remedies failed.

It may be resorted to in the dose of from 20 to 30 grains (1.3–2.0), taken an hour or two before the sweat is expected. In very obstinate cases as much as 60 grains (4.0) should be given, but under these circumstances it should be used in two separate doses of 30 grains (2.0) each, two hours apart, in order to avoid irritating the stomach. It is best given in capsule, as it is insoluble in water. In other instances camphoric acid may be given in the following formula:

℞.—Acid. camphoric.	ʒiv (16.0).
Alcohol	f℥ij (64.0).
Mucilag. acaciæ	f℥iij (96.0).
Syr. aurantii corticis	q. s. ad f℥vj (128.0).—M.

S.—Dessertspoonful (8.0) to a tablespoonful (16.0) one hour before sweat is expected.

It is worthy of note that camphoric acid is possessed of little power in cases of bromidrosis in the writer's experience.

CANNABIS INDICA.

Indian Hemp (*Cannabis Indica*, *U. S.* and *B. P.*) is the flowering tops of the female plant of *Cannabis sativa*. It is to be distinctly separated from the so-called American, American-Indian, or Canada hemp, or *Apocynum Cannabinum*, which is an intense irritant and drastic.

Physiological Action.—Given in full dose to man, this drug causes exhilaration and attacks of incessant laughter arising from the slightest cause, the person seeming convulsed with merriment; in other cases the sensations are disagreeable, and even death may seem imminent to the deranged mind. Sometimes the sensation of very full breathing comes on, and the patient thinks he is about to burst with the inflation of his lungs. After this deep sleep appears, lasting for many hours, even as much as fourteen or fifteen, without any intervals of wakefulness. If the dose be very large, the respirations are slowed very considerably, but no death from the use of cannabis indica by man is on record, and enormous amounts have been given to the lower animals without causing a lethal effect.[1] Applied to mucous membrane, it acts as a very severe irritant, and then as a local anæsthetic, but the primary effect is so powerful as to prevent its local application to mucous membranes for the relief of pain.

One of the most constant and pressing symptoms in poisoning in man is the marked sensation of prolongation of time, so that minutes seem like hours, and, in addition to this, a peculiar separation of the mental powers occurs, during which both hemispheres of the brain seem to think differently on the same subject.

Therapeutics.—Cannabis indica is one of the best additions to cough mixtures that we possess, as it quiets the *tickling in the throat*, and yet does not constipate or depress the system as does morphine. In advanced *phthisis* it is justifiable to keep the patient constantly in a state of quiet comfort by its use. For the relief of *pain*, particularly that depending on nerve-disturbance, hemp is very valuable. Before the introduction of antipyrin and its congeners tincture of gelsemium and the tincture or extract of cannabis indica were our best remedies in the treatment of *migraine*. The gelsemium under such circumstances should be given in full dose, 20 drops (1.3) of the tincture, and be followed by 10 to 20 drops (0.65–1.3) of the fluid extract of cannabis indica, it being known that the sample about to be used is active. After this dose of gelsemium the patient should be carefully watched, lest he suffer from an excessive influence of the drug, as such an amount may produce great depression in susceptible persons. In true *migraine* with hemianopsia this treatment is often most effectual in aborting the attack. The prevention of further attacks is to be attained by the use of smaller amounts of the cannabis indica during the intervals, the gelsemium only being used at the onset of the symptoms. In *paralysis agitans* cannabis indica may be used to quiet the tremors, and in *spasm of the bladder*, due to cystitis or nervousness, it often gives great relief. In *sexual impotence*, not dependent upon organic disease, it is said to be of value combined with strychnine or nux vomica and ergot. When a patient suffers from sleeplessness which is due in part to pain and in part to nervousness, the following prescription may be given:

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[1] The author has injected as much as 5 drachms of a fluid extract, active in the dose of 10 minims to man, into the jugular vein of a small dog without producing death for many hours.

℞.—Chloralis }
Sodii bromidi } . . . . āā ʒj (4.0).
Ext. belladonnæ fl. . . . . fʒj (4.0).
Ext. cannabis indicæ fl. . . . . fʒj (4.0).
Syr. lactucarii . . . . f℥iij (90.0).
Aquæ destillat. . . . . q. s. ad f℥vj (190.0).—M.
S.—Tablespoonful (16.0), in water, at a dose at night, to be repeated once. Shake well before using.

In *headaches* at the menopause cannabis indica is useful, and if the headaches are associated with constipation and anæmia, iron and aloes should be given simultaneously. Where headaches are due to *retinal asthenopia* a very useful prescription, according to de Schweinitz, is as follows:

℞.—Tr. nucis vomicæ . . . . fʒij (8.0).
Tr. cannabis indicæ . . . . fʒij (8.0).—M.
S.—15 drops (1.0), in water, twice or thrice a day.

The following prescription has been found to be very efficient in the hands of the author in treating *gastralgia* and similar forms of pain:

℞.—Tr. capsici . . . . fʒij (8.0).
Tr. cannabis ind. . . . . f℥ss (16.0).
Tr. opii deodorati . . . . f℥j (32.0).
Spt. chloroformi . . . . f℥j (32.0).
Spt. lavandul. comp. . . . . . . q. s. ad f℥iv (128.0).—M.
S.—Teaspoonful (4.0) every hour until pain is relieved.

In cases of *uterine subinvolution*, *chronic inflammation*, *and irritation* cannabis indica is of great value, and it has been found of service in *metrorrhagia* and *nervous and spasmodic dysmenorrhœa*. Not only does it relieve the pain, but it seems to act favorably upon the muscular fibres of the uterus.

In *acute* and *chronic Bright's disease* cannabis indica often allays the painful sensations over the renal region, and has been recommended by some writers in the cases in which bloody urine is present. In *gonorrhœa* it is said to decrease the discharge and prevent *chordee*, and it has supplanted the use of copaiba and cubebs in some practitioners' hands. It should not be used in the early stages of gonorrhœa, but in the later or subacute stages. There is some foundation for the belief that in small doses it acts as a *sexual stimulant*.

The advantages possessed by it are that it does not constipate, nor does it cause after-depression and nausea. On the contrary, there is often an increase rather than a decrease of the appetite under its influence. In the Anglo-Saxon race the cannabis-indica habit is practically unknown, but in the East Indies when used to excess it sometimes causes maniacal insanity, from which the patient nearly always recovers after some days, weeks, or months.

Administration.—The employment of this most valuable remedy is handicapped by its frequent lack of power—a fault which is largely dependent upon its preparation. The drug as prepared by Parke, Davis & Co. has proved efficacious in the author's hands for a number of years. The physician should always employ some preparation known by him to be active by personal trial before condemning the drug as a failure in a given case.

The dose of the solid extract (*Extractum Cannabis Indicæ, U. S.* and *B. P.*) is from ¼ to ½ grain (0.015–0.03), that of the fluid extract (*Extractum Cannabis Indicæ Fluidum, U. S.*) from 4 to 20 minims (0.3–1.3), and that of the tincture (*Tinctura Cannabis Indicæ, U. S.* and *B. P.*) from 15 minims to 1 drachm (1.0–4.0).

CANTHARIS.

Cantharis (*U. S.* and *B. P.*), or "Spanish Fly," is really a beetle, known as the *Cantharis vesicatoria*, and as such appears with iridescent coverings or wing-sheaths of a bluish or greenish hue. The insects come chiefly from Spain, Italy, and Sicily, and from the southern parts of Russia. Those from Russia are supposed to be the best. According to Leidy, the vesicating substance is in the blood, the eggs, and the secretions of the generative apparatus. The blistering substance contains cantharidin as an active principle, but cantharidin is not medicinally employed.

Physiological Action.—Locally applied to the skin, cantharides causes irritation and finally vesication. The blister produced may be quite large, and enough of the drug may be absorbed to cause fever and nervous excitement. The ingestion of a moderate dose of cantharides produces a sensation of warmth in the stomach and slight stimulation of the genito-urinary system, particularly the kidneys and urinary tracts. Large amounts produce great pain in the lumbar region, burning in the bladder and along the entire urethra, priapism, agonizing vesical tenesmus, widespread acute nephritis, bloody urine, which is scanty at first, and finally suppressed, with great irritation of the external openings of the genito-urinary apparatus. The inflammatory changes which are produced may cause sloughing of the penis or of the labia in the female.

Violent gastro-enteritis is nearly always a pressing condition. A diagnostic sign of cantharidal poisoning, where the beetles have been swallowed, is the appearance of pieces of the iridescent wings and coats in the vomit. Thirst is always a prominent symptom of poisoning by cantharides.

Therapeutics.—Cantharides are employed internally and externally. When given by the mouth the tincture is used as a *uterine stimulant*, to affect the uterine mucous membrane and relieve *amenorrhœa* in cases where atony and depression are the cause of the suppression. Some persons teach that the tincture of cantharides is a valuable remedy in small doses in the second stage of acute *desquamative nephritis*, but in the instances where the writer has seen it used it has made matters much worse, although it is supposed to decrease the quantity of the albumin and blood. In the later stages, where the kidneys are relaxed and torpid or where *albuminuria* comes on on the slightest exertion, cantharides in the dose of 1 drop (0.05) of the tincture three times a day are of great service.

In cases of *chronic parenchymatous nephritis*, particularly where alcoholism is the cause of the disease and the kidneys are inactive, cantharidal tincture is very useful. In *pyelitis* and in *chronic cystitis* it is of service, and it has been recommended very highly in drop doses in irritability of the bladder in women and children. In these cases the bladder must not be inflamed, but irritable from depression. The use of cantharides is of value in *incontinence of urine* of a minor degree, as that occurring in some elderly or nervous females when coughing, sneezing, or laughing, and will often given relief after many years of suffering. In *chordee*, in the dose of 1 drop (0.05) twice or thrice daily, it is sometimes of service. For *impotence* depending upon *sexual excess* Ringer asserts that the use of 10 to 15 drops (0.65–1.0) of the tincture of cantharides, with full doses of the tincture of the chloride of iron and nux vomica, will often relieve the patient and enable him to beget children. The drug has no true aphrodisiac influence except when given in almost toxic dose. In *gleet* of a very chronic type and in *prostatorrhœa* it is of service. Dermatologists have used cantharides internally as a remedy in *psoriasis*, *eczema*, *lichen*, and *prurigo*, with asserted great success. The dose should not be large enough to irritate the stomach or kidneys.

Externally, cantharides are used in the production of blisters for the purpose of causing the absorption of effusions or as a *counter-irritant* of some severity in cases of *deep-seated inflammations*. (See Counter-irritation.) Care should be taken that a sufficient amount of the drug is not absorbed to cause strangury and renal irritation. In renal *congestions* and *inflammations* the use of cantharides as a counter-irritant is often contraindicated because of this danger. Huchard and others have reported cases in which, without any previous disease of the kidney, a cantharidal blister has produced violent acute nephritis, with uræmia therefrom. In the proportion of 1 drop (0.05) of the tincture of cantharides to 40 (2.65) of water it is said to be a very good application for *burns*, but how it acts is not known.

Administration.—The dose of the tincture (*Tinctura Cantharidis*, *U. S.* and *B. P.*) is from 1 to 10 drops (0.05–0.65), and it is the only preparation used internally. The cerate (*Ceratum Cantharidis*, *U. S.*) is used, spread upon a rag, to produce a blister, and the cerate of the extract, which is no longer official, is used for the same purposes and in the same manner. The cantharidal collodion (*Collodium Cantharidatum*, *U. S.*) is a method of applying the blister which is most cleanly, but there is more danger of absorption of the irritant if it is used. The collodion acts as a protective to the part. The papers of cantharides (*Charta Cantharidis*, *B. P.*) are used as blisters, but are weak in action. The liniment of cantharides (*Linimentum Cantharidis*, *Liquor Epispasticus*, *B. P.*) is employed as a counter-irritant.

"Warming plaster" (*Emplastrum Picis Cantharidatum*, *U. S*) is a mild counter-irritant to be employed where a blister is thought to be too severe. The preparations of the *B. P.*, other than those named, are *Acetum Cantharidis*, *Charta Epispastica*, *Emplastrum Calefaciens*, *Emplastrum Cantharidis*, and *Unguentum Cantharidis*.

The unofficial plasters of cantharides made by several firms are the best preparations to use for the production of a blister. In order to obtain a perfect effect the skin should be washed thoroughly with soap and water and dried with a towel, which should be rough enough to produce reddening of the cuticle. After this the skin should be wet with vinegar, and while wet the blister is to be applied.

CAPSICUM.

Capsicum, U. S., Capsici Fructus, B. P., or Cayenne Pepper, is the fruit of *Capsicum fastigiatum*, a native of tropical Africa and of Central America. It occurs in long ovoid pods, which, when ripe, are scarlet red and possess a very hot, burning taste. The active principle is capsicine, which is a dark reddish liquid, or, in other words, is a volatile alkaloid.

Physiological Action.—Locally applied to the skin or mucous membranes, capsicum causes great redness, and finally, in the case of mucous membranes, vesication. The alkaloid will also produce these changes in the skin. When used internally for any length of time in excess capsicum will cause a chronic or subacute gastritis with pain and discomfort over the liver and stomach. If single large doses are used renal irritation and inflammation ensue, with strangury and high-colored urine. Taken internally, capsicum is said to act as a circulatory stimulant.

Therapeutics.—In cases of *atony of the stomach* due to general *debility*, errors in diet, and *alcoholism* of the chronic type capsicum is one of the best remedies we have. When the patient is suffering from *acute alcoholism* the gastric mucous membrane is often too much irritated to permit of its use, but after the lapse of some days it may be found of benefit for the purpose of increasing the appetite. As a remedy for *subacute alcoholism* it is quite useful, since by its stimulating effect and hot sensation it often satisfies, at least to some degree, the craving for liquor. Under these circumstances it should be used in the dose of 5 to 10 drops (0.3–0.65) of the tincture every four or five hours, or as the oleoresin in pill in the dose of ½ to 1 grain (0.03–0.05). The following prescription has been found of great service in these cases:

℞.—Tr. capsici	fʒijss (10.0).
Tr. opii deodorat.	fʒij (8.0).
Spt. æther. nitrosi	fʒiv (16.0).
Tr. lavandulæ comp. . . . . q. s. ad	f℥iv (128.0).—M.

S.—Dessertspoonful (8.0) every four or five hours.

In the *flatulent colic* of old persons and young adults capsicum will be found not only to act as a carminative, but also to prevent the development of the gas. In *low fevers* it has been used as a diffusible stimulant, but it is of doubtful value. It is rather in the *anorexia* of convalescence that capsicum acts most favorably. In *chronic nephritis* it is of considerable service, and it tends to check *albuminuria*, but it is only to be used in the chronic forms and stages of renal disease or in the treatment of functional torpidity of the kidney. The tincture is to be given under these circumstances in the dose of 20 drops (1.3) or less, but in some cases which are very chronic, as much as 40 drops (2.65) may be used. In *sore throat* and *simple tonsillitis* the tincture of capsicum and glycerin, half and half, are very useful as a local application applied by means of a swab. The same preparation may be used as a gargle for *relaxed uvula* and *sore throat.*

Capsicum may be used as a gastro-intestinal stimulant to aid in the absorption of other drugs. Applied externally, capsicum acts as a counter-irritant, producing redness of the skin, but not a blister in the ordinary individual. It is one of the best moderate counter-irritants which can be used, and it may be employed by saturating blotting-paper, time and time again, in the tincture of capsicum, allowing it to dry between each dip. This paper should finally be placed when warm and wet over the part, and held closely to the skin by a compress. Capsicum plaster (*Emplastrum Capsici, U. S.*) is useful in *lumbago* and *rheumatism* when placed over the affected muscles, and in *headache* when applied to the nape of the neck. The tincture is sometimes painted over *chilblains* which are unbroken. The following method, given by Ringer from Rheims, is very efficacious in this annoying affection:

"Make a strong tincture of capsicum-pods by steeping them for several days in a warm place in twice their weight of rectified spirits of wine. Dissolve gum arabic in water to about the consistence of treacle. Add to this an equal quantity of the tincture, stirring together with a small brush or a large camel's-hair pencil until they are well incorporated. The mixture will be cloudy and opaque. Take sheets of silk or tissue-paper; give them, with the brush, a coat of the mixture; let them dry, and then give another. Let that dry, and if the surface is shining, there is enough of the peppered gum; if not, give a third coat. This paper should be applied in the same way as court-plaster to chilblains that are not broken and burns that are not blistered, and it will speedily relieve the itching and pain. It acts like a charm and effects a rapid cure. The same is true of discolored bruises. It likewise allays rheumatic pains in the joints."

The dose of capsicum is 1 to 2 grains (0.05–0.1) in powder, on food or in pill. The dose of the tincture of capsicum (*Tinctura Capsici, U. S.* and *B. P.*) is 10 to 30 drops (0.65–2.0), and of the oleoresin (*Oleoresina Capsici, U. S.*) ¼ to ½ grain (0.015–0.03). The dose of the fluid extract (*Extractum Capsici Fluidum, U. S.*) is 1 to 3 minims (0.05–0.15). The plaster (*Emplastrum Capsici*) is useful for external applications.

CARBOLIC ACID.

Carbolic Acid (*Acidum Carbolicum, U. S.* and *B. P.*) is also known as Phenol, Phenylic Alcohol, and Phenic Acid. Not only is it an acid, but in addition it is an alcohol of the peculiar group known as the phenols, which are derived from coal-tar by a process of distillation.

Carbolic acid is sold in several grades, No. 1 being the purest. Both Nos. 1 and 2 are crystalline, while Nos. 3, 4, and 5 are impure, because of the presence of cresylic acid and other foreign substances.

Only No. 1 should be ordered when carbolic acid is to be given by the mouth.

It has a peculiar characteristic odor, and varies in color according to its method of preparation and purity. It is soluble in 20 per cent. of water, but it is liquefied by the addition of 6 per cent. of water. Carbolic acid should be kept in dark amber-colored, well-stoppered bottles.

If the crystals be exposed to the air, they undergo liquefaction, and in consequence the purest carbolic acid is usually prescribed in drop doses rather than in grains. It is soluble in alcohol, ether, chloroform, glycerin, and most oils. It unites with alkaline bases to form salts, carbolates, but these are very readily decomposed even by the feeblest acids, such as carbonic acid.

Physiological Action.—Locally applied to the skin, carbolic acid produces at first a burning sensation, accompanied by a diffuse reddening of the surface. If the solution be strong, the part at once becomes temporarily painful, then bleached and numb, so that tactile sensibility is destroyed. Applied to mucous membranes, it causes similar changes, but to a more marked degree, and may even act as a moderately severe caustic of a superficial type. Owing to the local coagulation of albumin produced by it, it cannot penetrate the tissues very deeply.

NERVOUS SYSTEM.—Carbolic acid acts as a depressant and paralyzant to the peripheral sensory nerves when locally applied. Upon the higher centres in the brain the acid produces a condition of depression and stupor.

The convulsions which sometimes occur after toxic doses have been taken are spinal in origin, as they occur after section of the spinal cord. The motor nerves escape almost untouched, as do also the muscles.

CIRCULATION.—Upon the circulation in the higher animals the drug exercises a distinct depressant influence, stopping the heart in diastole in lethal dose, and paralyzing the vasomotor centre even before the cardiac muscle is affected. These changes follow only lethal doses. Small medicinal doses have no effect of any moment upon the circulation.

RESPIRATION.—After large doses the breathing becomes more rapid and full. These changes, according to Salkowski and others, are due to stimulation of the respiratory centres and the peripheral vagi. Lethal doses almost invariably kill by failure of respiration due to depression of the respiratory centres.

TEMPERATURE.—Carbolic acid acts as a feeble depressant to normal bodily temperature even when given in medicinal dose, and also decreases the bodily heat in fever. It lowers fever by diminishing heat-production and increasing heat-dissipation. This antipyretic power is hardly sufficient to permit of its use in disease for this purpose.

KIDNEYS AND ELIMINATION.—When carbolic acid is given in overdose the kidneys may become so irritated that total urinary suppression may occur. When taken in large quantity it causes the urine to become brownish-black. This discoloration is due to an oxidized educt of carbolic acid which is not yet isolated. Carbolic acid is eliminated in the urine as a sulphocarbolate of sodium and potassium and as glyco-uronic acid and hydrochinon. Part of it is burnt up in the body.

It is to be distinctly understood that the dark urine of carbolic-acid poisoning is not due to the presence of blood or any of its educts.

Poisoning, Prolonged and Acute.—As the changes produced in the tissues of the body by acute and chronic poisoning by carbolic acid are identical, they may be considered together.

Carbolic acid is one of the most deadly and rapidly-acting poisons known, although this fact does not seem to be generally recognized. If a large lethal dose be swallowed by a man, he may drop dead from its effects before he can go more than a few feet from the spot where he stood when drinking the drug, or he may live a few hours. In cases where death has occurred suddenly from taking this acid the direct cause has been failure of respiration. If the patient does not die at once, all the evidences of gastro-enteritis come on. Violent vomiting and purging may ensue, and burning pain in the entire abdomen is a prominent symptom. The skin is wet with sweat, the face pinched and anxious. Collapse, with a thready, imperceptible pulse and extreme dyspnœa, may be present. The mouth and lips may not smell of the drug, but the mucous membrane will be seen to be corrugated and stained black if impure acid has been taken, or be whitish if the pure drug has been used. The eschar on the mucous membrane is a peculiar one, and is pathognomonic of the poison, having a white centre surrounded by a reddened and inflamed zone, the centre sometimes becoming dark brown or black. The post-mortem will show these spots in the œsophagus and stomach, and even in the intestines. All the internal organs, as the brain, kidneys, liver, and spleen, will be found filled with dark grumous blood, and on opening the body the strong odor of the acid will be perceived. A peculiar croupous exudate is sometimes found in the bronchial tubes, and fatty degeneration of a more or less wide-spread type often follows carbolic-acid poisoning. Langerhans has noted that in some of these cases evidences of croupous pneumonia exist. A very common symptom is hoarseness of the voice, due to an effect on the larynx after the drug is absorbed, and not from its local influence.

A large number of cases are on record in which carbolic-acid poisoning has been produced by its absorption from surgical dressings. One of the earliest signs of such an accident is the darkened, smoky hue of the urine and a slight nervous unrest or cerebral disturbance. Very often pain in the lumbar region indicates kidney strain and irritation. The dressings should be, of course, at once removed.

Treatment of Poisoning.—The chemical antidote to carbolic acid is any soluble sulphate, such as Epsom or Glauber salts, which form insoluble sulpho-carbolates. As these salts follow the acid into the blood-vessels and tissues to unite with it, the mere fact that hours have elapsed since the poison has been taken does not invalidate the propriety of using these sulphates. The further treatment consists in the administration of warm mucilaginous drinks, hot applications to the extremities, the hypodermic injection of cardiac and respiratory stimulants, such as digitalis and strychnine, morphine to relieve pain, and the use of counter-irritation over the abdomen. Emetics and the stomach-pump should be used if possible, but the former are generally useless because of the state of the stomach.

Therapeutics.—Internally carbolic acid is little used, but, nevertheless, has a very favorable effect in certain states. In *nervous vomiting* or in that due to *gastric irritation* the drug does good in ½- to 2-drop (0.03–0.10) doses by depressing the sensory nerves in the stomach.

In *diarrhœa* depending upon fermentation from 2 to 4 drops (0.10–0.20) of the acid do great good, particularly if combined with 10 to 20 grains (0.65–1.3) of bismuth administered in powder or capsule.

In *gangrene* and *tuberculosis of the lung* a spray of the acid in water in the strength of 5 to 15 drops (0.3–1.0) to the ounce (32.0) may do some good, and at least control the *cough* and relieve the irritation and *tickling in the throat*.[1] Creosote is, however, generally preferred in these conditions at the present time.

Externally the acid is very largely employed as an antiseptic lotion and in solutions in which to place instruments while operating. The solutions for this purpose should be in the proportion of 1 of acid to 20 of water. (See Antiseptics.)

Carbolic acid is rarely used directly over *wounds* in dressings at present unless the dressing be one of carbolized oil. Other drugs have supplanted it. The use of the carbolized spray over wounds has been found to do more harm than good, and it ought never to be employed.

In *diphtheria*, *ulcerated sore throat*, and even in ordinary *stomatitis*, carbolic acid will be found of value when used in a spray or mouthwash in the proportion of 1 part to 75 parts of water, and in ordinary *sore throat* or that due to sepsis in the strength of 1 part to 100 of water it will be found, when applied on a swab or by a gargle, to relieve the pain and inflammation. In the treatment of *burns* carbolized sweet oil in the proportion of 1 drachm (4.0) of the acid to each 6 ounces (192.0) makes one of the best dressings that can be used. By means of the local anæsthesia produced by the acid, minor operations, such as *eversion of an ingrowing toe-nail* or opening a *felon*, may be performed by soaking the part for ten minutes in a solution of 30 parts to 100, and applying the pure acid by means of a brush to the line of the incision. Carbolic acid may be used as a lotion in the *itching of jaundice* in the proportion of 10 grains (0.65) of the acid to 2 drachms (8.0) of glycerin and 2 drachms (8.0) of water, or, better still, 4 drachms (16.0) of sweet oil. In *enlarged glands* which have not yet gone on to *suppuration* intraglandular injections of carbolic acid by means of a hypodermic needle are of value in a large number of cases, the solution used being no weaker or stronger than 2 per cent.; 5 to 10 minims (0.3–0.15) of this solution is sufficient for each gland. In the treatment of buboes 10 minims (0.65) of a solution of 8 grains (0.5) to the ounce (32.0) may be injected into the swelling, the skin being first benumbed by an ether spray. This is a most successful treatment. The same treatment may be applied in *chronic synovitis* and repeated every three days, and *boils* and *carbuncles* may also be so treated with great success if the measure be used early enough to abort the trouble.

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[1] The spray must be a very fine one, or it will not carry the drug far enough down into the lungs to do any good.

In the form of an ointment carbolic acid may be used in the strength of 10 minims to the ounce (0.65 : 30.0) of simple cerate, particularly in cases of *subacute eczema* where there is a great amount of weeping and itching.

As a *disinfectant* carbolic acid ranks among the poorest: 1 to 2 per cent. solutions, however, kill most spores and germs.

Administration.—Carbolic-acid ointment (*Unguentum Acidi Carbolici, U. S.* and *B. P.*) and the glycerite (*Glycerita Acidi Carbolici, U. S.*) are the only official preparations of carbolic acid in the *U. S. P.* In the *B. P.* the following preparations are official: *Acidum Carbolicum Liquefactum*, given in the dose of 1 to 2 minims (0.05–0.10); *Glyceritum Acidi Carbolici;* and *Suppositoria Acidi Carbolici cum Sapone*, each suppository containing 1 grain (0.05) of carbolic acid.

CARBON (CHARCOAL).

Carbo Ligni, U. S. and *B. P.*, or Charcoal, is prepared by the exposure of soft wood to a red heat, air being prevented from coming in contact with the wood during the process. Charcoal when used for medicinal purposes should be a black, brittle, somewhat shiny, porous substance, devoid of taste and odor, and completely insoluble in water.

Therapeutics.—Charcoal is used externally as an application to *old sores* or *sloughs* to act as a *deodorant* and *antiseptic*. This it accomplishes by the absorption of any liquids which may be present, thereby depriving germs of a nidus, and by its distinct oxidizing power. It may be applied in the form of a dry powder or in a poultice, which is, however, so uncleanly that other antiseptic dressings are better.

The poultice (*Cataplasma Carbonis, B. P.*), if used, should be made in the following manner: Take of powdered wood-charcoal ½ ounce (16.0), bread-crumbs 2 ounces (64.0), linseed meal 1½ ounces (48.0), and add boiling water 10 fluidounces (320.0). Macerate the bread-crumbs and meal for ten minutes over the fire, and then stir in the charcoal to the extent of half the amount just named. Spread out the poultice and sprinkle the remaining half of the charcoal over its surface, and apply to the part affected while hot.

Internally, charcoal is used in powder in many conditions, and acts very well indeed in cases of so-called "*sour stomach*" from which eructations of gas or sour liquids take place.

The following prescription will also be found useful in the *atonic* or *subacute gastric catarrh* of persons who are careless in eating and who have much belching:

℞.—Oleoresin. capsici	gtt. x vel xx (0.65–1.3).
Pancreatin.	gr. xx (1.3).
Pulv. zingiberis	gr. xl (2.65).
Pulv. carbon. ligni	gr. xl (2.65).—M.

Ft. in pil. No. xx.
S.—One or two t. d.

As ordinary charcoal is not always obtainable, it may be substituted by pieces of very thin toast burnt through and through till they resemble charcoal. A few of these pieces will, when eaten, often stop all the symptoms mentioned. If the attack is very severe and vomiting eventually ensues, the ejecta will commonly be found to be odorless and not sour, and the stools will also be almost odorless, though black. In *fermentative and acid diarrhœas* in children and adults this method of treatment is often of value. When charcoal is used in any condition associated with irritation of the mucous membranes of the gastro-intestinal tract, it should always be very finely pulverized.

As a filter for impure water, charcoal, in mass or in powder, is one of the most satisfactory substances we have.

CARBONATE OF POTASSIUM.

Carbonate of Potassium (*Potassii Carbonas, U. S.* and *B. P.*). This salt is never used in medicine, except to prepare other salts, as it is disagreeable to the taste and is an irritant. (See Potassium Citrate.)

CARBONATE OF ZINC.

Precipitated Carbonate of Zinc (*Zinci Carbonas Præcipitatus, U. S.; Zinci Carbonas, B. P.*) is used as a protective, rather astringent powder over surfaces affected by *weeping eczema* or other skin lesions accompanied by similar moist discharges. It may be employed to fulfil all the indications commonly treated by the oxide of zinc. It is very largely used, not as the precipitated carbonate, but as the impure or native carbonate, under the name of calamine.

The following prescription is useful for *moist eczema:*

℞.—Calaminæ . . . . ʒj (4.0).
Ung. zinci oxidi . . . . ʒvij (28.0).—M.
S.—Apply to the eczematous spot.

In cases of *infantile intertrigo*, or redness of the buttocks and genitals, from maceration due to liquid fæces in infants suffering from diarrhœa, or where the urine is irritating, the following lotion is very useful indeed:

℞.—Pulv. calaminæ }
Pulv. zinci oxidi } . . . . āā ʒij (8.0).
Glycerini . . . . ʒiv (16.0).
Alcoholis . . . . f℥ij (64.0).
Aquæ . . . . q. s. ad Oj (½ litre).—M.
S.—Apply with a mop after each removal of the diaper.

CARDAMOM.

Cardamom (*Cardamomum, U. S.*) is the fruit of *Elettaria Repens*, and is a bitter tonic possessing some aromatic properties. It is useful in cases of *atony of the stomach and small intestine*, particularly if combined with a mineral acid or some other bitter tonic, such as gentian. Cardamom is official in the *B. P.* as *Cardamomi Semina.*

If the intestine is atonic and secretion is deficient, the following prescription will be found of value:

℞.—Acid. nitric. dil. . . . . f℥j (4.0).
Tr. cardamomi comp. . . . . . q. s. ad f℥vj (192.0).
S.—Dessertspoonful (8.0) after each meal.[1]

Administration.—The official preparations of cardamoms are the tincture of cardamoms (*Tinctura Cardamomi, U. S.*), dose 1 to 3 drachms (4.0–12.0); and the compound tincture (*Tinctura Cardamomi Composita, U. S.* and *B. P.*), which is to be given in the same dose as the tincture. This tincture also contains cochineal, cinnamon, caraway, and glycerin. Cardamom is also a constituent of the official aromatic powder (*Pulvis Aromaticus, U. S.*).

CASCARA SAGRADA.

Cascara Sagrada is the bark of the *Rhamnus Purshiana, U. S.*, a plant growing in California. It is sometimes called California buckthorn, to distinguish it from ordinary buckthorn or *Rhamnus Frangula*, which it closely resembles in many ways, and which may be used as a substitute for cascara sagrada in some cases.

Therapeutics.—Cascara sagrada ought never to be used as a purge, but only as a laxative. It is by far the best remedy we have when employed simply to empty the bowel of fæcal matter in cases of *constipation*, since it not only performs this function without intestinal disturbance, but simultaneously acts as a tonic to the intestine, and so prevents the constipation which usually follows the use of all other drugs of its class.

Cascara sagrada is most commonly employed in this country in the form of the fluid extract (*Extractum Rhamni Purshianæ Fluidum, U. S.*, or *Extractum Cascaræ Sagradæ Liquidum, B. P.*), in the dose of from 10 to 20 drops (0.65–1.3) at night or morning and night. If 20 drops (1.3) fail to act, 30 drops (2.0) may be used, but if larger doses are required other drugs should be employed as adjuvants, as fluidrachm doses of the fluid extract of cascara may produce irritation of the bowel, and enteritis or intestinal catarrh. The objection to cascara sagrada is its bitter taste, which may be partially overcome by the additional use of the Syrupus Aurantii, in the proportion of 1 part of the cascara extract to 2 parts of the syrup of orange-peel.

Some of the preparations of this drug are now made in an almost tasteless form, such as "Cascara Cordial," or the non-bitter aromatic fluid extract made by a prominent firm in this country. The solid extract (*Extractum Cascaræ Sagradæ*) is official in the *B. P.*, and given in the dose of 2 to 8 grains (0.1–0.5) in pill.

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[1] While the rule that an acid is incompatible with a tincture is not recognized in this mixture, the quantities of acid and alcohol are so disproportionate that ether in any amount is not developed.

CASSIA FISTULA.

Cassia Fistula, U. S., is the fruit of *Cassia Fistula*, or Purging Cassia, as it is sometimes called, and occurs in long, dark-brown pods containing a dark pulp in each segment. This pulp is the useful part of the drug, and is official in the *B. P.* as *Cassiæ Pulpa.* Cassia fistula ought never to be used alone, as it is too apt to cause pain and griping, but it is officially present in the Confection of Senna (*Confectio Sennæ, U. S.* and *B. P.*), and may be given in the dose of ½ drachm to 1 drachm (2.0–4.0) as a laxative, or as much as ½ ounce (16.0) may be used if a purgative effect is desired.

CASTOR OIL.

Castor Oil (*Oleum Ricini, U. S.* and *B. P.*) is a fixed oil derived by expression from the beans of *Ricinus Communis*, a plant of the United States and elsewhere, but originally derived from India. It contains an acrid substance, ricinoleic acid.

Physiological Action.—The manner in which castor oil purges is somewhat in doubt, but its activity probably depends upon the presence of the acid just named and the fact that it is an oil.

As is well known, oils—such as olive oil, for example—if given in considerable quantity, tend to move the bowels, and the ricinoleic acid, which is somewhat acrid, stimulates the small and large gut, and so develops peristaltic movement. According to some writers, this acid is not set free until the oil is attacked by the pancreatic juice. That this acid possesses purgative properties of itself seems proved by the fact that the oil will purge when it is rubbed in by the skin, and that nursing mothers on taking the oil eliminate the acid in the milk to such an extent that the suckling is purged. According to the studies of Rutherford and Vignal, the oil has no effect over biliary secretion other than that violent purgation indirectly increases the flow, and the researches of Hess have shown that the oil acts more rapidly in the small than in the large gut, and only produces peristalsis by coming in contact with the mucous membrane.

Therapeutics.—Castor oil is the blandest and most unirritating purge we have, with the exception of the sulphate of magnesium, which is depletant and much more rapid in its effects. While the Epsom salt will act in one half to one hour if the stomach is empty, castor oil will generally act in four hours, or perhaps five.

Castor oil is used whenever irritant materials, such as bad food, putrid flesh, or decaying or green vegetables, have been eaten, even if the inflammation set up after them is very active. If hard bodies, such as broken cherry-stones, have been swallowed, castor oil is a far better purge than sulphate of magnesium, as it is more gentle and lubricates the gut, thereby preventing scraping and irritation. Where mucus has accumulated in the bowel in children, and must be gotten rid of before other treatment is resorted to, castor oil should be used. Previous to *parturition* it has been largely used to relieve the bowels of fæcal matter, and is said by old practitioners to make the labor easier than if any other purge is used. It is also employed in the *constipation* following acute diseases and in that occurring in infants and children.

The disadvantages of castor oil lie in its taste, the fact that it is oily, that it tends to produce hemorrhoids if used constantly, and finally that its frequent use, or even a single dose, is generally followed by more obstinate constipation than before, so that the dose must be rapidly increased in size to be effective. This is one of the reasons why it is useful in *irritative diarrhœas*, for having swept out the mucus and offending matter it checks the movements of the bowels afterward. The purgative effect of castor oil is very much increased if a little bicarbonate of sodium is given with it.

Administration.—Castor oil is very much more agreeable to the taste if pure than if poorly prepared. It is also true that too great purification renders it less active.

The methods directed for taking castor oil are as various as the tastes of individuals. Its odor may be covered by a drop or two of the oil of bitter almonds, but emulsions of the oil are not of any service, save to interfere with its efficiency. Some take the oil in the foam of beer or porter, others in syrup of sarsaparilla and soda-water, and still others in milk or cream. A good way to take it is to eat one or two strong so-called cream peppermint drops, or even the crystalline peppermint drops, swallow the oil from a spoon which is to be placed well back in the mouth, and immediately eat several other peppermints. This plan is improved by using the oil in milk or water, so that the liquid carries the oil down into the œsophagus without its touching the mucous membranes. It may also be taken in highly seasoned beef-tea. Ringer recommends the following: ½ ounce (16.0) of oil, fresh syrup of acacia 3 drachms (12.0), and distilled water 5 drachms (20.0), flavored with a little oil of lemon or peppermint. Wood advises that it be mixed with glycerin, equal parts, to which is added a drop or two of oil of gaultheria or oil of cinnamon. By far the best way of administering it is in soft capsules containing from ¼ to 1 drachm (1.0–4.0). Most persons can swallow as much as a teaspoonful in capsule, and several capsules containing this quantity, or a smaller amount, may be given at once to complete the necessary dose. The capsules should be dipped in water in order to render them slippery and so more easily swallowed.

The dose of castor oil for an infant is 1 to 2 teaspoonfuls (4.0–8.0), and for an adult ½ ounce to 1 ounce (16.0–32.0).

Owing to the fact that the oil will very frequently produce griping, a few drops of laudanum should be added to it, or tincture of belladonna may be used. If these cannot be employed, a drop of the oil of cinnamon is equally useful for this purpose.

CATECHU.

Catechu (*U. S.*) is derived as an extract from *Acacia Catechu*. The catechu of the *U. S. P.* is true catechu; that of the *B. P.* is in reality an extract of gambier, being derived from the leaves and shoots of *Uncaria Gambier*. Catechu depends for its medicinal use upon the astringent properties which it possesses. Beyond this power it has no particular value.

It is of a dark-red color, has a somewhat sweetish taste, and is insoluble, like most extracts, in water.

Therapeutics.—Like all the vegetable astringents, catechu is used as a remedy for *diarrhœa*, particularly that of the serous type or that in which the stools are of too fluid a consistency. If large amounts of mucus in the passages show a catarrhal state of the bowel, the mucus should be displaced by a purge of castor oil or sulphate of magnesium before the astringent is used.

Catechu may or may not be combined with opium in cases of diarrhœa, but the following prescription will be found of service in many instances:

For an adult:
℞.—Tinct. catechu composit. . . . . f℥ij (64.0).
Tinct. opii camphoratæ . . . . f℥ij (64.0).
Misturæ cretæ . . . . f℥ij (64.0).—M.
S.—Dessertspoonful (8.0) every four hours till relieved. To be shaken before using.

In cases of *sore throat* where the secretion is excessive and the inflammation subacute catechu may be used as a gargle.

In cases of *spongy gums* catechu is sometimes useful as a mouthwash. If the powdered catechu is used internally, the dose is 20 to 30 grains (0.1–2.0). The dose of the Compound Tincture of Catechu (*Tinctura Catechu Composita*, *U. S.*) is 1 to 2 fluidrachms (4.0–8.0). Its only constituent besides the catechu is cinnamon. The Troches of Catechu (*Trochisci Catechu*, *U. S.* and *B. P.*) are to be employed in sore throat, and are to be held in the mouth. They are not generally used.

The official preparations of the *B. P.*, besides the ones given, are: *Infusum Catechu*, given in the dose of 1 to 1½ fluidounces (32.0–48.0); the tincture (*Tinctura Catechu*), dose 1 to 2 fluidrachms (4.0–8.0); and a compound powder (*Pulvis Catechu Compositus*), composed of catechu, kino, and rhatany, the dose of which is 20 to 40 grains (4.0–8.0).

CAUSTIC POTASH.

Caustic Potash (*Potassa*, *U. S.*; *Potassa Caustica*, *B. P.*) is a hard, white solid, which readily deliquesces; it possesses great caustic power, and is used in medicine for the purpose of burning away *growths* or *exuberant ulcers*. A piece of the drug should be placed on the skin by means of a pair of forceps, when it will at once soften down and burn the tissues until it can reach no farther. The surrounding skin should be protected by wax, suet, or oils, and a piece of adhesive plaster with a hole for the growth should first be applied to prevent any action on the surrounding healthy tissues. The burn produced by caustic potash is very painful, and cauterization through its influence should not be practised if it can be avoided. When the caustic has acted sufficiently, it is to be washed off with vinegar or other dilute acid. Vienna paste (*Potassa cum Calce*, *U. S.*) is used for the same purpose as is caustic potash.

CAUSTIC SODA.

Caustic Soda (*Soda*, *U. S.*; *Soda Caustica*, *B. P.*) is milder than caustic potash, and its action is more readily controlled. It should be used in the same way and for the same purposes as is caustic potash, and the surrounding skin ought to be protected by adhesive plaster and oil or ointment.

The soda must be kept in well-stoppered bottles made of hard, strong glass. The only official preparation of caustic soda in the *U. S. P.* is *Liquor Sodæ*, or solution of soda.

CERIUM OXALATE.

Cerium Oxalate (*Cerii Oxalas*, *U. S.* and *B. P.*) is a white granular powder, permanent when exposed to the air, odorless and tasteless, and insoluble in water and alcohol, but freely so in hydrochloric acid.

Therapeutics.—It is often used instead of or combined with bismuth in the treatment of the *vomiting of pregnancy* or that due to uterine disorders and displacements, and in some cases of *gastric acidity*. The dose is from 2 to 5 grains (0.10–0.3), given in pill form every four or five hours.

CHENOPODIUM.

Chenopodium (*U. S.*) is the fruit of the *Chenopodium ambrosioides*, or American wormseed. The seeds contain a volatile oil and have a distinct and rather disagreeable aromatic odor. These seeds, rubbed up into a powder, form with a syrup an electuary which is a most efficient remedy against the *ascaris lumbricoides*, or *round-worm*, as it occurs in children. The dose of the powdered seeds is from 10 to 30 grains (0.65–2.0). The better way of using chenopodium is in the form of the oil (*Oleum Chenopodii*, *U. S.*) in the dose of 10 drops (0.65) to a child of five years, either on sugar or in an emulsion made of gum acacia. If the patient is old enough, capsules may be used. The general dietetic measures adopted for the removal of worms should be insisted upon before the drug is given. (See article on Worms.)

CHIMAPHILA.

Chimaphila (*U. S.*), or Pipsissewa, is the leaves of *Chimaphila umbellata*, an evergreen found in America, Europe, and Asia.

Therapeutics.—Pipsissewa is a drug employed in *atonic renal conditions*, particularly of the functional type, as a stimulating diuretic, which will bring into activity the secreting structure of the kidney and the mucous membranes of the genito-urinary tract. It is also a tonic to the stomach. For this reason it is often placed in mixtures given to dropsical patients if debility and anorexia are present. In the treatment of ulcers of the skin due to struma it is said to be of service, and it probably has some slight alterative power. The drug may be used in the form of a decoction, which is not official, in the dose of 1 to 3 fluidounces (32.0–100.0), and as the fluid extract (*Extractum Chimaphilæ Fluidum, U. S.*) in the dose of ½ to 1 drachm (2.0–4.0).

CHIRETA.

Chireta (*Chirata, U. S.* and *B. P.*) is the plant *Swertia Chirata*, which is a native of India. It is a bitter tonic, possessing a very distinct influence over the liver, and, unlike many bitter tonics, is devoid of tannic acid. For this reason it may be used with preparations of iron. Chireta may be given in all cases of *indigestion* and *loss of appetite*, particularly where the *liver is torpid* or if any tendency to *constipation* is present, although it is not directly laxative. When given in powder the dose is 20 grains (1.3); the dose of the fluid extract (*Extractum Chiratæ Fluidum, U. S.*) is 30 drops to 1 drachm (2.0–4.0), while that of the tincture (*Tinctura Chiratæ, U. S.* and *B. P.*) is 1 to 4 drachms (4.0–16.0). The unofficial solid extract may be given in pill in the dose of 2 to 4 grains (0.1–0.2). The dose of the infusion (*Infusum Chiratæ, B. P.*) is a wineglassful (32.0).

CHLORAL.

Although the name Chloral is applied to the substance used in medicine, chloral proper is never so employed, hydrate of chloral (*Chloral Hydras, B. P.; Chloral, U. S.*) being the real preparation. Chloral hydrate is a white, crystalline body, but is often sold in irregular broken masses, which are generally impure. It should be kept in tight bottles in a cool, dark place.

Physiological Action.—When chloral is applied to a mucous membrane it causes distinct reddening and burning pain, and finally acute inflammation. It is, therefore, a local irritant. Chloral acts in the body as chloral, and is not broken up into formic acid and chloroform, as was taught at one time.

NERVOUS SYSTEM.—In medicinal and toxic dose chloral produces sleep by quieting the intellectual centres in the brain, at the same time depressing the motor tract of the spinal cord and the motor nerves. In medicinal amounts it does not decrease sensation, but in toxic doses it does. Very often hyperæsthesia of the skin results from small doses. Reflex action is decreased by its sedative influence on the motor portions of the spinal cord.

CIRCULATION.—A dose of 10 to 20 grains (0.65–1.3) in the adult rarely causes any circulatory changes, but larger amounts produce a fall of arterial pressure and a slow, feeble, or sometimes a rapid-running pulse, due to a direct depression of the heart-muscle, for chloral in overdose is a cardiac paralyzant.

After death from chloral the blood may be found dark and grumous-looking, with the corpuscles broken down, but these changes occur only after very large doses.

Respiration.—In moderate amounts no respiratory effect is felt, but in toxic doses the breathing becomes slower and slower and more and more shallow, until it stops in death. When death is caused by chloral it is due to respiratory failure, with an almost simultaneous arrest of the heart.

Temperature.—Chloral tends to lower bodily heat, and in large doses produces a very marked fall of temperature, which does much toward causing death. Brunton has found that rabbits will survive very large doses of the drug if external heat is supplied to them. The fall of temperature is, at least in part, due to the failure of the circulation and vascular dilatation.

Kidneys, Tissue-waste, and Elimination.—Chloral is eliminated by the kidneys in the form of uro-chloralic acid and, if given in excess, as chloral. Large amounts irritate these organs, and may produce bloody urine, owing to the nephritis which is set up as the drug passes through the renal structures. After chloral is ingested the urine of a patient will often give Fehling's test for sugar.

Poisoning.—When a poisonous dose of chloral is taken by man, the person soon falls asleep and then sinks into a deep coma. The respirations become at first slow and labored, then shallow and feeble. The pulse, at first perhaps a little slowed, soon becomes rapid, thready, and shuttle-like, and is finally lost at the wrist. The face is white and livid, the forehead and the hands covered with a cold sweat, and the pupils, which are at first contracted, soon become widely dilated. Absolute muscular relaxation is present, and it is impossible to arouse the patient.

Treatment of Poisoning.—The physician should apply external heat and use emetics in the early stages, or, if the case is seen too late for emetics to act because of systemic depression, he should use the stomach-pump. This latter means of removing the drug from the stomach is safer and more reliable, because the production of vomiting may result in efforts which will strain the heart. Strychnine should be given in full dose, $\frac{1}{20}$ to $\frac{1}{10}$ of a grain (0.003–0.006) to stimulate respiration, or atropine may be used for the same purpose. The heart is to be supported by 10-drop (0.65) doses of tincture of digitalis, given hypodermically every twenty minutes until some effect is noted; and, as the digitalis is rather slow in its action, it may be preceded by ether and ammonia or brandy or whiskey. The patient must not raise the head to vomit, and the head should be placed on a lower level than the heels to aid in maintaining the circulation of blood in the vital centres at the base of the brain.

In *chronic poisoning* by chloral or in cases in which the patient has come to use the drug as a habit the patient suffers from weakness, mental and physical, with sudden flushings due to vasomotor disorder, from palpitation of the heart, and finally from petechial eruptions, bed-sores, ulcerations, and sloughs.

Therapeutics.—Chloral is the purest hypnotic that we have, and may therefore be used where simple *nervous insomnia* is present, but not when *sleeplessness* is due to pain. Under such circumstances it is to be employed in the combination of 10 grains (0.65) of chloral with ⅙ of a grain (0.01) of morphine, as a much more powerful hypnotic effect is produced by the combined action of the two drugs than by the use of either one of them alone.

The following prescription may be used:

℞.—Chloralis . . . . ʒij vel iv (8.0–16.0).
Morphinæ sulphatis . . . . gr. ij (0.1).
Syr. lactucarii (Aubergier) . . . . f℥ij (64.0).
Aquæ . . . . q. s. ad f℥iij (96.0).—M.
S.—Dessertspoonful (8.0), in water, at 10 and at 11 P. M., if necessary.

In *tetanus* and *strychnine-poisoning* chloral is the best remedy we have, as it depresses the motor tract of the spinal cord. In such a case it should be given in 20-grain (1.3) doses combined with 60 grains (4.0) of bromide of potassium. If the convulsion prevents deglutition or is brought on by swallowing, these remedies should be used by the rectum dissolved in starch-water; and if the spasm expels them from the rectum, the patient should be chloroformed long enough to allow the injection to be given and absorbed. The same remedies in small doses are to be used in *infantile convulsions* and in *infantile colic* in the dose of ½ grain to 1 grain (0.03–0.06) of chloral to 2 grains (0.1) of bromide of potassium or sodium in a teaspoonful of peppermint-water and syrup. In *chorea*, *paralysis agitans*, and *delirium tremens* chloral is of great service, but must be given cautiously in the latter condition, for fear it may depress the heart, which is already diseased by alcoholic excess. Cases are on record where chloral has caused sudden death from cardiac failure in the persons of alcoholics with fatty heart—an accident the liability to which is increased by the fact that owing to the addiction of the patient to a narcotic drug it requires large doses to produce sleep. In *uræmic convulsions* chloral has been highly extolled, but if any acute renal trouble is present, it must not be used, lest it irritate the kidneys. In *puerperal convulsions* not dependent upon nephritis 20 to 30 grains (1.3–2.0) of the drug may be given, and repeated in one or two hours.

Hiccoughs, *nocturnal epilepsy*, and *whooping cough* are all indications for its use, but in asthma it rarely does good, and if pushed is dangerous to the heart.

Untoward Effects.—Chloral sometimes causes nausea, purging, and vomiting by reason of its irritant action. In susceptible persons doses of 10 to 15 grains have produced marked redness of the eyes with swelling of the conjunctiva. Sometimes the last-named symptoms are only produced when an alcoholic beverage is taken simultaneously.

Administration.—Chloral is best given in syrup of acacia, simple syrup, or water. It should be always well diluted. The syrup of chloral (*Syrupus Chloralis*, *B. P.*) is given in the dose of 1 fluidrachm (4.0). The following prescription is useful in insomnia:

℞.—Chloralis	ʒj vel ʒij (4.0-8.0).
Potassii bromidi	ʒij (8.0).
Syr. pruni virginianæ	f℥j (32.0).
Aquæ	q. s. ad f℥iij (96.0).—M.

S.—Dessertspoonful (8.0) at night.

Sometimes chloral can be well given in junket by adding it to a liquid rennet, and then adding the rennet to the milk. (See Junket, Part III.)

The question as to the safe dose of chloral is one largely governed by the susceptibility of the patient, but alarming symptoms have followed a dose of 30 grains, and death after from 30 to 45 grains. Thirty grains in twenty-four hours is certainly ample in most cases.

CHLORALAMIDE.

Chloralamide is a compound very recently introduced into medicine, formed by the addition of formamide to anhydrate of chloral, and is a colorless crystalline substance, soluble in 9 parts of water and 1½ parts of alcohol. Its taste is slightly bitter, but not biting, and it keeps well in watery solution without decomposition. Its physiological action is closely allied to that of chloral, except that it is not quite so depressing to the circulation. Upon the nervous system it acts chiefly upon the brain and spinal cord, and produces sleep—a result to be expected, since both chloral and formamide are hypnotics. It is said not to irritate the stomach and kidneys, but it probably is only less irritant than chloral.

Therapeutics.—Chloralamide may be employed in medicine whenever chloral may be used. It is decidedly a nervous sedative, and in the wakefulness of *nervous insomnia* is very useful. Sleep generally ensues about thirty to forty-five minutes after it is taken. According to most of the reports published so far, the drug relieves pain as well as produces sleep, and is therefore distinct in its actions from chloral. In *neuralgia* it is very useful, and it has been found of value in the pains of *tabes dorsalis*. The dose is 10 to 30 grains (0.65–2.0), which may be repeated in three or four hours, although the sleep generally lasts five to eight hours. The following formula may be used for its administration:

℞.—Chloralamide	gr. xl (2.65).
Acid. hydrochlorici dil.	gtt. v (0.3).
Syrupi	fʒij (8.0).
Aquæ dest.	f℥ij (64.0).—M.

S.—Take in two doses in a little water.

Very recently, Charteris has claimed very extraordinary results in the treatment of *sea-sickness* by the use of equal parts of chloralamide and bromide of potassium. He gives it in the dose of 30 grains (2.0) with an equal amount of the bromide. It is necessary for the patient to take a cholagogue for two days before starting on his voyage, and as soon as he gets on board the ship to take the dose named on an empty stomach, and at once to go to bed and to sleep. If this is done, Charteris claims that the patient will awake feeling bright and well, and remain so for the rest of the voyage. This combination under the name of "chlorobrom" has been largely used as a hypnotic in the treatment of the *insomnia* due to melancholia and acute mania.

CHLORALOSE.

Chloralose is a compound made from anhydrous chloral and glucose, is soluble in hot water and alcohol, and was introduced into medicine as a safe hypnotic and substitute for chloral. Unfortunately its taste is acrid, and to some persons nauseous, particularly if taken in water.

Physiological Action.—The physiological action is practically identical with that of chloral, but much more mild if the researches of Mosso are correct. Its dominant effect is on the brain, and full doses depress the spinal cord and heart. Poisonous doses may produce hæmoglobinuria.

Therapeutics.—The indications for the drug are *functional insomnia*, and the beginning dose is 2 to 7 grains (0.1–0.5), but the smaller dose should always be tried first, particularly in women. Sleep follows its ingestion in about half an hour.

The best way to administer the drug is to give it in capsules or cachets, and to follow it with a glass of water or milk.

Untoward Effects.—Sometimes chloralose produces diplopia, muscular tremors, or constant passing of the hands over the head and face. If a habit is induced by its constant use, it is a noteworthy fact that its power to produce sleep is decreased, while the untoward effects are more likely to be marked. In nervous and tuberculous patients it sometimes causes tetanic or cataleptic symptoms with disturbed intellection.

CHLORATE OF POTASSIUM.

Chlorate of Potassium (*Potassii Chloras, U. S.* and *B. P.*) is a salt of potassium differing entirely in its physiological action from all the other potassium salts, and, with the exception of the cyanide of potassium, is certainly the most poisonous. Not only is it, when locally applied, an irritant to mucous membranes, but when it is absorbed into the blood it causes changes of a serious character in this fluid, and produces acute nephritis if given in overdose.

Caution should be used in handling this drug, as if it comes in forcible contact with organic matter an explosion may occur.

Physiological Action.—It has been thought by some that chlorate of potassium gives up a large amount of oxygen to the body, and that for this reason it would be of value in cases of slow asphyxia, such as result from pneumonia or phthisis. It has even been recommended to persons crossing high mountains where the rarity of the air produced disagreeable effects; but nothing is more absurd than the belief that it gives up oxygen to the body. Chlorate of potassium does give off oxygen when treated with very high heat, but not at the temperature of the body. Nearly all of it escapes from the body unchanged.

When overdoses of the chlorate are taken, it produces sickness of the stomach, headache, pain in the loins and belly, dyspnœa, cyanosis, heart-failure, and great weakness. The blood is dark and of a chocolate color, this change being due to the production of methæmoglobin. The blood-corpuscles are crenated and broken down, and the liver, kidneys, and spleen are found, after death, softened and filled with broken-down and disorganized blood.

Therapeutics.—Chlorate of potassium is useful in *stomatitis* and in mercurial sore mouth as a mouth-wash, or, given internally, in the following mixture:

℞.—Potassii chlorat. . . . . gr. xlviij (3.0).
Tr. myrrh. . . . . f ʒss (2.0).
Elixir calisayæ . . . . q. s. ad f ℥iij (96.0).—M.
S.—Teaspoonful (4.0) every five hours, or use as a mouth-wash.

Owing to the fact that the drug is eliminated by the saliva to a great extent, the mucous membranes affected by stomatitis are constantly bathed by a solution of the chlorate when it is taken by the stomach. If any irritation of the stomach or kidneys exist the medicament must be used on a swab and none of it swallowed.

In *diphtheria* chlorate of potassium is very commonly employed, but its use is exceedingly dangerous. Death in many cases of diphtheria is due to the renal irritation present, or, in other words, to an acute nephritis, and this drug simply increases the inflammatory process. If the chlorate of potassium is employed in diphtheria it should be used in solution and applied by means of a swab. (See Diphtheria.)

In *anginose sore throat* chlorate of potassium is a useful gargle. and Wood recommends the use of a solution made by adding 1 ounce (32.0) of sumach-berries, ½ ounce (16.0) of chlorate of potassium, and 1 pint (500.0) of boiling water to each other, and allowing them to simmer for a few hours, when the mixture should be strained, cooled, and used as a gargle.

The following is equally serviceable:

℞.—Potassii chlorat. . . . . ʒj (4.0).
Ext. rhois glabræ fl. . . . . f ℥ss (16.0).
Aquæ dest. . . . . q. s. ad f ℥iij (96.0).—M.
S.—To be added to an equal quantity of water in a glass and used as a gargle after stirring every two hours.

This prescription makes an abominable-looking pharmaceutical preparation, but an exceedingly useful one.

In *acute rectal catarrh* with *mucous diarrhœa* and tenesmus a solution of chlorate of potassium in water, 20 grains (1.3) to the ounce, injected into the bowel, will often produce a cure after one or two injections. Not more than 4 ounces (128.0) should be used, and it ought to be retained for twenty minutes. Often it will be well to add the saturated watery solution of the chlorate to an equal quantity of starch-water, as the latter aids in allaying the local irritation. This same method can be used in the treatment of *hemorrhoids*, and a few drops of laudanum, if added to this solution, will be found of great service. The troches (*Trochisci Potassii Chloratis*, *U. S.* and *B. P.*) are given in the dose of 1 to 6, each lozenge containing 5 grains (0.3). They are intended to be dissolved in the mouth to affect the oral mucous membrane, but are apt to disorder the stomach by reason of the drug being swallowed in the saliva.

CHLORIDE OF SODIUM.

Chloride of Sodium (*Sodii Chloridum*, *U. S.* and *B. P.*), or Common Salt, is a useful drug and food, aiding in maintaining the alkalinity of the blood and tissues and in the formation of gastric juice, being changed by the lactic acid of the stomach into lactate of sodium, thereby setting free hydrochloric acid, which acts not only by aiding digestion, but in the production of pepsin from the pepsinogen of the gastric tubules. The dose is 10 to 20 grains (0.65–1.3).

CHLORIDE OF ZINC.

Chloride of Zinc (*Zinci Chloridum*, *U. S.* and *B. P.*) is a white, crystalline, deliquescent powder, of caustic taste and acid reaction, possessing considerable disinfectant power. It has been used as an eye-wash in the strength of 1 to 2 grains to the ounce (0.06–0.10 : 32.0), but is rarely so employed at present. The same solution may be used as an injection in the second stage of *gonorrhœa*. Under the name of *Liquor Zinci Chloridi*, *U. S.* and *B. P.*, is prepared a strong solution of the salt for disinfectant purposes of the strength of about 50 per cent.

Numerous experiments with the proprietary "chlorides" sold as disinfectants show them to be possessed of very slight disinfectant power, but to be strongly antiseptic.

CHLORINATED LIME.

Chlorinated Lime (*Calx Chlorata*, *U. S.*; *Calx Chlorinata*, *B. P.*) is the hydrate of lime, containing 35 per cent. of chlorine, provided it is of official strength. It is an exceedingly irritant substance because of the chlorine which it contains, and is never used internally.

Much of the chlorinated lime sold is useless, containing too little or no free chlorine. Good chlorinated lime should be so laden with the gas that the face cannot be held near it without the eyes being severely irritated. Unless the chlorine is present, the lime is of no value, for the employment of chlorinated lime as a disinfectant depends upon the action of this gas, the lime being used merely as a vehicle and oxidizer, the gas by itself being difficult of application.

Uses.—As a disinfectant for privies, drains, and sinks chlorinated lime is one of the best, if not the best, we possess. A few pounds of it may be added every week to the contents of a privy vault with great advantage, and a solution of it may be used in all bed-pans and urinals. When the passages of a patient having typhoid fever are to be received in a bed-pan, a chlorinated-lime solution should be placed in the receptacle beforehand, so that the fæcal matter or urine will fall at once into a disinfecting fluid. The solution should be of the strength of 1 pound to 2 gallons. As it is one of the most powerful deodorizers, chlorinated lime should be placed liberally over and about decaying animals, and in exhuming corpses sheets wrung out in a solution made as directed above will, if wrapped about the body, be found of service to destroy the stench.

Water which has become fœtid by stagnation may be rendered drinkable by adding 1 to 2 ounces of the chlorinated lime to every 65 gallons, and standing the solution aside for some hours until precipitation and exposure to the air have gone on for some time.

It should be remembered that chlorine fumes will bleach many dyed goods, and therefore they cannot be used on colored fabrics.

Chlorine gas, in a diluted form, has been used for the treatment of *aphonia* due to cold in cases where the aphonia persists for some months. It can be obtained by allowing a few drops of hydrochloric acid to fall upon chloride of lime or chloride of sodium.

The placing of chlorinated lime in saucers about sinks and closets is useless, as the amount of chlorine liberated is very slight as compared to the volume of air in the room. Where the chlorine is present in a sufficiently concentrated form to kill germs, it will also kill the occupant of the chamber. A deodorant effect may be obtained, but a bad smell, if it exists, even when overcome by a greater one, is not really gotten rid of. The official preparations of the *B. P.* are *Liquor Calcis Chlorinatæ* and *Vapor Chlori.*

CHLORODYNE.

Chlorodyne is a preparation used to a very large extent by the English for the treatment of *serous diarrhœas* or *cramps in the stomach.* Even in England its constitution varies considerably, but the formula most commonly used is as follows:

℞.—Morphinæ hydrochlor.	gr. viij (0.5).
Aquæ dest.	fʒss (2.0).

Heat together, and as soon as the morphine is dissolved and the liquid cooled, add

Acid. hydrochlor. dil.	fʒss (2.0).
Chloroformi	fʒiss (6.0).
Tr. cannab. indicæ	fʒj (4.0).
Acid. hydrocyanic. dil.	♏xij (1.0).
Alcoholis	f℥ss (16.0).
Ol. menth. piperit.	♏xij (1.0).
Oleoresinæ capsici	♏j (0.05).—M.

S.—5 to 15 drops (0.35–1.0) for an adult, in water, every two hours for three doses. More than this quantity is dangerous.

CHLOROFORM.

Chloroform was originally discovered by Guthrie (1831) of Sackett's Harbor, New York, but first brought into medicinal use (1847) by

Simpson of Edinburgh. It is a clear liquid of an exceedingly hot, burning, sweetish taste, of a rather agreeable odor, and is very volatile in the presence of ordinary air.

There are two kinds of chloroform—the purified (*Chloroformum Purificatum, U. S.*) and the commercial chloroform (*Chloroformum Venale*). Chloroform should be kept in a dark, cool place.

If exposed to the light for any length of time, chloroform develops carbonyl chloride, hydrochloric acid, and chlorine, which render it unfit for use. If the acid is present it will turn blue litmus red, and if chlorine is present it will form a white precipitate with nitrate of silver. Such decomposed chloroform may be rectified by shaking the chloroform with slaked lime and filtering till the irritating products are gotten rid of. If impure because of improper methods of manufacture, an oily odor will be left on the hand after evaporation takes place. We find, therefore, that chloroform fit for use should be absolutely transparent and colorless, neutral to test-paper, non-irritating when inhaled, and should evaporate entirely, leaving no residue or smell on a watch-glass. It should have a specific gravity of from 1.491 to 1.525, should form no precipitate with $AgNO_3$, should not become brown when heated with caustic potash, and only very faintly brown, if at all, when shaken with concentrated H_2SO_4. The method of manufacture of Pictet, by which the chloroform is purified by crystallization, probably gives us the purest article. In this country the chloroform made by Squibb of Brooklyn is almost universally employed.

Chloroform vapor in the presence of gas-flame undergoes certain changes which result in the development of noxious and irritating fumes, consisting principally of hydrochloric acid and chlorine, which produce laryngeal and bronchial irritation.

Physiological Action.—Locally applied to the skin, chloroform may produce some tingling and burning, even if evaporation be not interfered with. If it be confined under a watch-glass on the skin, it will cause a blister and act as a counter-irritant.

When inhaled, chloroform produces a sensation of warmth in the mouth and throat, a feeling of relaxation, and finally unconsciousness. The respirations are at first full and deep, but soon become more rapid and shallow. The pulse may be somewhat stronger and fuller for a short interval, but soon fails in strength and becomes more rapid. The irritation produced in the air-passages by its inhalation is very slight, and no primary arrest of respiration ensues, as is generally seen after ether is first given. The pupils are at first slightly dilated, but are contracted during anæsthesia. *If the pupils dilate during the use of chloroform after the contraction just named, danger is imminent and death may suddenly occur.* In some persons the first effects of chloroform are violent struggles, and there is danger in trying to overcome these struggles by pushing the drug very rapidly. This struggling is particularly apt to be met with in athletes and drunkards. Total muscular relaxation should never be caused by the drug.

NERVOUS SYSTEM.—Chloroform first affects the brain, then the sensory part of the spinal cord, then the motor tract of the cord, then the sensory paths of the medulla oblongata, and finally the motor portion of the medulla, thereby producing death from failure of the vasomotor centre and of the respiratory centre, unless, as rarely occurs, the heart has already succumbed to the drug. On the sensory and motor nerves, when locally applied, it acts as an irritant and anæsthetic. Upon these nerve-trunks, when taken by inhalation, it has little or no effect.

CIRCULATION AND RESPIRATION.—The effects of chloroform upon these vital functions have been for many years a subject of hot dispute between various surgeons and pharmacologists. On the one hand has been the school originally led by Syme of Edinburgh, which has asserted that death or danger from chloroform lay in failure of the respiration, and that this was the function to be watched while chloroform was being used; on the other hand, the so-called London school has asserted that death arose from cardiac failure and that the pulse was the thing to be watched during the use of chloroform. The number of clinical and laboratory researches which have been carried out to determine which of these opinions was correct has been very great, both in England and in America, but it has only been within the last ten years that the greatest and most competent studies have been undertaken, of which the best known is the series made through the munificence of His Highness the Nizam of Hyderabad in India, and known as the "Reports of the Hyderabad Chloroform Commissions Nos. 1 and 2." The conclusions of the first commission having been criticised adversely because it asserted that the cause of death was respiratory failure, a second commission was formed, and, under a grant of $5000 from the Nizam, Dr. T. Lauder Brunton of London was sent out to direct the second investigation. Although a teacher of the theory that death from chloroform is due to cardiac failure, this gentleman returned to England converted to the idea that the cause of most of the fatal accidents under this drug is respiratory failure, and the conclusions of Commission No. 2 were once more criticised by numerous clinicians and pharmacologists in England and America. About this time H. C. Wood and the author published a paper in which they expressed their belief in the powerful depressing effects produced by chloroform upon the heart; and MacWilliams of Glasgow proved by experiment that chloroform without doubt causes cardiac dilatation and enfeeblement. Shortly after this the author of this article was asked by the government of His Highness the Nizam, through Colonel Edward Lawrie, the Residency Surgeon, to carry out a series of studies[1] designed if possible to reconcile the contradictory results reached by the Hyderabad Commissions and other investigators, and simultaneously Gaskell and Shore in Cambridge University, England, were asked to do likewise. The result has been to confirm in every way the results of all previous studies in one respect—namely, that the primary action of chloroform on the vital functions of circulation and respiration is *greatly to depress the vasomotor system*, thereby causing an extraordinary fall of blood-pressure. Gaskell and Shore, to be sure, assert that anæsthesia can be produced by chloroform without causing this fall, but the author has never been able to do so. They also believe that the fall is chiefly a result of cardiac failure. With this view the author dissents, because their experiments upon which these assertions are based were too complex to give practical results ; and second, because his own studies and those of others show the vasomotor system to be depressed. There is of course some cardiac enfeeblement and dilatation, which adds to the fall of pressure.

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[1] See *Therapeutic Gazette*, October, 1893.

As with other discussions in medicine, the truth of the question as to whether chloroform causes death by respiratory failure or cardiac failure lies, as it were, halfway between the two antagonistic forces ; and, further than this, the somewhat startling statement may be made that it is not directly due, in the majority of cases, to either of these causes. On the contrary, *the cause of death from chloroform is usually vasomotor depression*, whereby the arterioles allow the blood to pass too freely into the great blood-vessel areas which are found in the capillaries and veins, and as a result the man is suddenly bled into his own vessels as effectually as if into a bowl. When it is remembered that the capillary network of the body will, with the relaxed veins, hold many times the normal quantity of blood, and when it is remembered that we can inject salt solutions into the vessels to the extent of several times the normal quantity of blood without raising the blood-pressure, it at once becomes evident that the complete vascular relaxation caused by chloroform results in failure of all the vital functions, not because the drug has paralyzed the heart or respiratory centre, but because these parts are deprived of blood by its stagnation in the widely dilated capillaries and abdominal veins. Recent studies by Leonard Hill on *The Physiology and Pathology of the Cerebral Circulation* showed that this was the case, for he asserts that when the blood was no longer flowing to the respiratory centres the heart was still beating, because its coronary arteries, being lower down, were more easily supplied by the small blood-stream received by the heart from the veins. These studies are proved by the experiments of myself and my assistant, Dr. Thornton,[1] by every tracing of the Hyderabad Commissions, and all other tracings we have ever seen. We may conclude, therefore, that while chloroform without doubt acts as a powerful depressant poison to the respiratory centre and the heart in the same manner as it paralyzes all living protoplasm when applied in excess, that when properly given by inhalation it produces a death equivalent to that resulting from hemorrhage, which is a failure of the respiration not so much from a direct depression of the respiratory centre as from its starvation of blood ; and while the tendency of the drug is to depress and dilate the heart, just as it dilates the vessels of which the heart is merely a highly specialized part, the failure in the pulse rests upon vasomotor palsy, the patient becoming pulseless because the heart has not any blood to pump.

Let us see what evidence supports this view : First, we have the laboratory tracings of many independent investigators extending over many years and made in all parts of the world, all of which show a fall of blood-pressure. Among these may be named Bowditch and Minot of Boston, Coats, H. C. Wood, Gaskell and Shore, the Hyderabad Chloroform Commissions, the studies of Wood and myself in 1889 and 1890, and of myself and Thornton in 1892 and 1893. They are confirmed by Hill, who has seen the abdominal vessels engorged with blood under chloroform, the medulla almost bloodless, and the heart still pumping though respiration had ceased. They are confirmed by my own experiments, in which I proved that even after the respiration had stopped and the carotid was empty, and the dog apparently dead, he could be resuscitated by visceral compression and artificial respiration, and by inversion, whereby the blood left the dilated abdominal veins for the heart and brain. Again, if a needle was inserted through the chest-wall, the heart was found to be beating, for the needle moved to and fro; and finally if the chest was opened the heart could still be found beating feebly—dilated, it is true, but beating.

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[1] *Therapeutic Gazette*, October, 1893.

So much for the laboratory evidence. What have we in clinical evidence? Equally positive proofs of vasomotor palsy, and none of death being purely cardiac or respiratory. For years Chisholm of Baltimore and later Howard Kelly and a large number of others have used inversion with compression of the floating ribs in artificial respiration, which has forced the blood into the chest and saved life again and again. For years the literature of medicine has teemed with reports of death from chloroform while the patient was sitting up or half recumbent, because, the blood-paths being dilated, this posture favored anæmia of the vital centres. Again, it has been proved both experimentally and clinically that the best vasomotor stimulant—belladonna or atropine—given before the chloroform increases its safety, and that compression of the limbs by bandages does likewise. Finally, Hill has shown that abdominal compression also produces resuscitation by sending the blood to the heart. On the contrary, saline transfusion, which at first glance would seem to be indicated, is useless, because the dilated blood-paths will receive all the saline for a long time before they will overflow toward the heart, for as fast as the fluid flows in they dilate.

My conclusions therefore are, that while chloroform in its general depressing power depresses all vital functions, it is the question of blood-pressure which is most important; and therefore in the use of chloroform we should always keep the head low, precede the use of chloroform by atropine hypodermically, bandage the limbs if the case is feeble or already bloodless, and if necessary place compresses on the belly and apply them deeply by pressure if a failing circulation is developed.

The primary action of the chloroform is to depress the blood-pressure chiefly by its vasomotor effect, secondly by its cardiac effect, and finally, while the drug does exercise a depressant effect on the respiratory centre, the failure of this centre is chiefly due to anæmia. As, however, an intact respiratory centre means regular breathing, we watch this function to determine the dose of chloroform actually inhaled, and because any variation in this function, as shown in irregular breathing, means that the chloroform is disordering arterial tension. Death from chloroform, then, is usually a vasomotor death, for an intact arterial system is as important to vital function as an intact cardiac apparatus.

BLOOD.—Upon the blood in the body chloroform has little or no effect when it is inhaled. Shaken with chloroform in a bowl outside the body, the blood becomes scarlet in hue.

TEMPERATURE.—Chloroform when taken by inhalation distinctly lowers the bodily temperature, probably by aiding in the dissipation of heat and by its action on the nervous mechanism of heat-production.

ELIMINATION takes place by the lungs and by the kidneys, and goes on very rapidly, owing to the great volatility of the drug.

If large amounts are eliminated by the kidneys, these organs are apt to become irritated and inflamed.

Antiseptic Power.—Salkowski has investigated, after Koch's methods, the degree to which chloroform-water acts upon micro-organisms. He has also used chloroform for some years to prevent urine from decomposing before he had time to examine it. Chloroform prevents all fermentations which depend upon the growth of micro-organisms—*e. g.* alcoholic fermentation, ammoniacal fermentation of urine, conversion of hippuric acid by fermentation into benzoic acid and glycocol, lactic-acid fermentation, and the putrefaction of albumins—but it has no action on those processes caused by unorganized ferments, as ptyalin, pepsin, etc.

Chloroform-water may be used to prepare solutions for subcutaneous injections, and be given internally in diseases of the digestive organs depending on the presence of micro-organisms—among other diseases, cholera. Possibly the benefit that many patients derive from stomachic mixtures which contain chloroform-water is due to its destructive action on various micro-organisms. It may also be employed as a mouth-wash.[1]

Untoward Effects.—Sometimes during the administration of chloroform the heart or respiration suddenly ceases, and in some cases this change is preceded by a peculiar shade or cloud which passes over the face of the patient. Death may come suddenly and without any warning. If untoward effects appear, the anæsthetic must be at once withdrawn and artificial respiration resorted to.[2] Injections of ether and hot brandy should be given beneath the skin, and the poles of a battery with a rapidly-interrupted current *swept over the body*, but not held over the phrenic nerve and diaphragm. The patient must be held head downward, so that the blood will flow to the brain, as Leonard

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[1] Chloroform-water is to be made by adding 1 fluidrachm of chloroform to 25 ounces of distilled water. The mixture is then put in a well-stoppered bottle, and shaken thoroughly until the chloroform is dissolved in the water. The dose is generally ½ to 2 ounces. The official chloroform-water is a saturated solution.

[2] While few text-books give any specific directions concerning the practical application of the methods which are to be employed in such emergencies, those that do so force the physician to a procedure at once dangerous and impractical; for the directions usually given are, to place the positive pole of the battery on the phrenic nerve as it crosses the anterior scalene muscle at the root of the neck, the negative pole being pressed against the lower margin of the ribs. A rapidly-interrupted current is now to be used with the purpose of causing contraction of the diaphragm by the direct action of the electricity upon the nerve. Even theoretically this is a possible source of danger, and practically the writer has proved danger to be ever present under such treatment. The cardiac inhibitory nerves run so closely to the phrenic fibres, and respond so readily to electrical stimulation, that it is hard to imagine how they can escape stimulation if a current be used of sufficient strength to excite the phrenic nerves near by. By practical experiment the writer has proved that inhibition of the heart may not only be possibly brought about by this method, but that it is nearly impossible to avoid such an effect if the phrenics are to be reached at all.

Hill and the author have shown that the chief cause of death is vasomotor relaxation with accumulation of all the blood in the abdominal vessels. Bandages should be applied to the limbs and compression by a bandage and large compress be exercised on the abdominal contents, and active artificial respiration practised for a long period of time as the most important measure for the patient's relief. External heat should be applied. Atropine, strychnine, and digitalis may be used to stimulate the heart and respiration. Of these strychnine is the most valuable. (See directions under the article on Ether.)

Simultaneously with the movements of artificial respiration an assistant should grip the tip of the tongue with a pair of forceps and draw it out of the mouth and upward from ten to fourteen times a minute in order to stimulate the diaphragm. (See Asphyxia.) In a certain number of cases patients apparently dead from chloroform have been resuscitated by repeated compression or massage of the præcordium.

The measures adopted for resuscitation should not be stopped for at least one hour, as persons have recovered as long as this after an accident from chloroform.

Ostertag has found that very prolonged inhalations of chloroform in the lower animals produce widespread fatty degeneration.

Therapeutics.—The first and most important use of chloroform is as an anæsthetic, and at this point we come to a question which has been for many years a matter of contention between different sections of the medical profession—namely, as to whether its use is dangerous. In the Southern and Western parts of the United States chloroform is nearly always used, but in the Eastern and Northern portions it is rarely employed. Southerners certainly seem to take chloroform better than Northerners or those living on the Atlantic coast. It is impossible to go into a general discussion of this question here; suffice it to state that even the most enthusiastic supporters of the use of chloroform confess that it is a more dangerous drug than ether if carelessly used, and, while the advantages of chloroform are many, this one great disadvantage overshadows them all.[1] The advantages are—its more agreeable odor and the fact that it does not irritate the air-passages, owing to the small amount necessary to cause anæsthesia; the fact that its use is less apt to be followed by nausea and vomiting; the rapidity of its action; and the small bulk which has to be carried by the surgeon. Its disadvantage is—the possibility of its killing the patient.

We come, then, to the all-important questions:

1. Is chloroform a safe anæsthetic?
2. Are we to watch the pulse or respiration during the use of the drug, and what are the signs in the respiratory function indicative of danger to the patient?
3. What is the true cause of death from chloroform?
4. Is death from chloroform possible when it is properly administered?

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[1] The mortality based upon many tens of thousands of cases where the patient is under chloroform is about 1 in 3500.

5. Under what circumstances is the surgeon to use chloroform in preference to the less dangerous anæsthetic, ether?

6. What is the best way of administering chloroform?

To the first question the answer is, Yes for the majority of cases, provided it is given by one who is skilled in its use, and not only knows how to give it, but how to detect signs of danger. It is not so safe as ether at any time, other things being equal, and never safe in the hands of a tyro.

To the second question the answer is, Watch the respiration, because as soon as enough chloroform is used to endanger the circulation the respiration will show some signs of abnormality, either in depth, shallowness, or irregularity. In other words, the very effect of the drug may be to cause such deep and rapid respirations that an excessive quantity of the drug is taken into the lungs and continues to be absorbed even after the inhaler is withdrawn.

As there is always a fall of blood-pressure under chloroform, it is difficult to feel the radial or temporal pulse, and the respiratory centre recognizes the degree of arterial depression which its sister vasomotor centre has permitted by finding that its blood-supply is insufficient. As respiration fails first, it should be watched first. It is only by watching the respiration that we can tell how much chloroform the patient is getting. We do not watch this function for danger alone, but to tell us of the dose.

Every one is agreed that the patient taking chloroform should have plenty of fresh air, and in India, to all intents and purposes, patients are operated on in the open air, at least as compared to the closed rooms necessary in America and Europe. This free supply of air is important, whether we believe death to be imminent from cardiac or respiratory failure; but this supply of air matters little to the patient if he does not breathe freely, nor does the amount of chloroform amount to aught if it is not drawn into the chest. The dose of chloroform is not the amount on the inhaler, but the amount taken into the chest, and, finally, the amount absorbed by the blood-vessels. The rapidity and depth of respiratory movements is, therefore, as Lawric asserts, the entire key to the situation. We withdraw chloroform, as Lawrie says, whenever respiration becomes disturbed in rhythm or when struggling disturbs it, because it is the first indication that the drug's action is uncertain, and because there is no telling the dose which is absorbed. While watching the respiration will not warn us of a sudden cardiac arrest in fatty heart plus chloroform depression, neither will the pulse give us such warning; and we are confident that the statement of the Hyderabad Commission, that the *respiration should be watched*, is correct, for we believe, from a long series of observations, that gradual cardiac failure never occurs without producing respiratory changes from the very first. In other words, we do not believe that in a *healthy* heart chloroform can cause serious disorder without, as a result of beginning disorder, disturbing respiration; and, second, that in the healthy heart a quantity of chloroform sufficient to disorder it will by its direct action disorder the respiration. If, as an extra precaution, one assistant watches the pulse while the other watches the respiration, very well, for though the respiration is the more important function to watch, the man watching the pulse might discover an irregularity which the anæsthetizer may not see reproduced in the respiratory action; but as divided attention generally means a slighting of both objects in view, Lawrie is right in insisting on the pulse being let alone.

The answer to Question 3 is that death is always due in the healthy person to vasomotor failure accompanied by respiratory depression, and vascular collapse may be severe enough to cause death, even if artificial respiration is used skilfully. Death only occurs in the healthy person when chloroform is given in excessive quantities.

The answer to Question 4 is, Yes. The physician having a case of heart disease requiring surgical interference, should always advise the patient of the danger of any anæsthetic, and he should remember, whether it is wise to tell the patient or not, that anæsthesia always means a step toward death, even in the healthiest of men. In the event of a death under chloroform the physician is not to blame if he has taken proper preliminary precautions and given the chloroform properly.

To Question 5 we have several answers to make:

1. Chloroform may be used in hot climates (when ether is inapplicable), where a free circulation of air increases the safety of the patient.

2. Chloroform may be used whenever a large number of persons are to be rapidly anæsthetized, so that the surgeon may pass on to others and save a majority of lives, even if the drug endangers a few, as on the battle-field, where only a small bulk of anæsthetics can be carried.

3. Its employment is indicated in cases of Bright's disease requiring the surgeon's attention, owing to the fact that anæsthesia may be obtained with so little chloroform that the kidneys are not irritated, whereas ether, because of the large quantities necessarily used, would irritate these organs. Quantity for quantity, ether is, of course, the less irritant of the two.

4. In cases of aneurism or great atheroma of the blood-vessels, where the shock of an operation without anæsthesia would be a greater danger than the use of an anæsthetic, chloroform is to be employed, since the greater struggles caused by ether and the stimulating effect which it has on the circulation and blood-pressure might cause vascular rupture.

5. In children or adults who already have bronchitis, or who are known to bear ether badly, or, in other words, have an idiosyncrasy to that drug, chloroform may be employed.

6. Persons who are robust and strong, and who struggle violently, are in greater danger from the use of chloroform than the sickly and weak, probably because the struggles exhaust the vasomotor system, strain the heart, and tend to dilate its walls.

Other indications for the use of chloroform in preference to ether are brain surgery, where ether is apt to produce meningeal congestion. In performing tracheotomy, if the case is urgent and the ether produces respiratory irritation, chloroform may be used with advantage. Finally, in operations about the mouth chloroform may be employed by passing a soft catheter into the nose and by means of a hand-bulb or Junker inhaler introducing chloroform vapor into the post-nasal spaces.

ADMINISTRATION.—When chloroform is given it should be poured drop by drop upon a folded napkin or towel, and the cloth should then be held about three to six inches from the mouth and nose, so that the vapor may be thoroughly mixed with air in the proportion of 95 per cent. of air to 5 of vapor. The administration must be gradual, as "pushing" the anæsthetic is dangerous.

The safest method of administration is by Lawrie's or Esmarch's inhaler, because these provide a free circulation of air and do not distract the attention of the anæsthetizer from the respiratory movement by complicated apparatus. Apparatus much like these, in allowing a free amount of air, is the Hyderabad chloroform inhaler or open-ended cone, with Krohne's and Seseman's respiration-indicator attachment.

The Junker inhaler, even with its modifications, is too complicated and cumbersome, and while less chloroform is wasted in administering the drug, it must be thrown out of the bottle afterward. If used at all, this inhaler should be used with the increased air-supply and respiration-indicator of Krohne and Seseman.

The dangers of chloroform seem to be considerably decreased by the simultaneous administration of oxygen gas with the anæsthetic vapor. (See Oxygen, Important.)

The author agrees so heartily with Lawrie's personal conclusions that he prints them below:

1. The chloroform should be given on absorbent cotton, stitched in an open cone or cap. (A depression made through the opening in the inside flannel bag will answer as well.)

2. To ensure regular breathing, the patient, lying down, with everything loose about the neck, heart, and abdomen, should be made to blow into the cone, held at a little distance from the face. The right distance throughout the inhalation is the nearest which does not cause struggling or choking or holding of the breath. Provided no choking or holding of the breath occurs, the cap should gradually be brought nearer to, and eventually may be held close over, the mouth and nose as insensibility deepens.

3. The administrator's sole object while producing anæsthesia is to keep the breathing regular. As long as the breathing is regular and the patient is not compelled to gasp in chloroform at an abnormal rate, there is absolutely no danger whatever in pushing the anæsthetic till full anæsthesia is produced.

4. Irregularity of the breathing is generally caused by insufficient air, which makes the patient struggle or choke or hold his breath. There is little or no tendency to either of these untoward events if sufficient air is given with the chloroform. If they do occur, the cap must be removed, and the patient must be allowed to take a breath of fresh air before the administration is proceeded with.

5. Full anæsthesia is estimated by insensitiveness of the cornea. It is also indicated by stertorous breathing or by complete relaxation of the muscles. Directly the cornea becomes insensitive or the breathing becomes stertorous the inhalation should be stopped. The breathing may become stertorous while the cornea is still sensitive. The rule to stop the inhalation should, notwithstanding, be rigidly enforced, and it will be found that the cornea always becomes insensitive within a few seconds afterward.

Above all things, it is necessary to remember the fact that a person having taken chloroform twenty times before does not show he is not in danger on taking it the twenty-first time, and it is also to be borne in mind that many of the sudden deaths from chloroform have occurred during the first inhalation of the drug, before consciousness has been lost, and, therefore, when an accident was least expected.

Before closing the consideration of the use of chloroform for anæsthetic purposes mention should be made of the so-called anæsthetic mixtures. Of these the A. C. E. is the best known. It consists in a mixture of 1 part alcohol (sp. gr. .838), 2 parts of chloroform (sp. gr. 1.497), and 3 parts ether (sp. gr. .735). Billroth's A. C. E. mixture is composed of chloroform 3 parts, and ether and alcohol 1 part each. The Vienna mixture consists in 1 part of chloroform and 5 of ether, and the so-called methylene mixture is 30 per cent. methylic alcohol and 70 per cent. chloroform. The object of all these mixtures is evident—namely, to get the anæsthetic effect of the ether and chloroform without the cardiac and respiratory effects of either, and the alcohol when added is to act as a stimulant. As the volatility of each ingredient varies, the mixture is useless, as the ether evaporates first, and the chloroform next, and the alcohol last. The A. C. E. is popular in England, but not so in the United States.

Chloroform inhalations have been recommended in *excessive chorea* and in *puerperal convulsions*, and are, of course, of great service in the *reduction of hernia*, owing to the muscular relaxation produced. Sometimes a few whiffs will put a nervous patient to sleep. Parturient women seem able to take chloroform with more safety than other women. There are four important factors in increasing the safety of chloroform in this class of cases: 1st. Less chloroform is given than usual in surgical operations; 2d. The pregnancy may produce immunity by reason of the slight cardiac hypertrophy produced at this time; 3d. The absence of fright, for the woman welcomes the anæsthetic; and 4th. The frequently recurring pains of labor so stimulate the vasomotor centre that the dominant action of chloroform—namely, vasomotor depression—is combated.

In severe *whooping cough* a few drops of chloroform may be poured on the hand of the attendant and held before the child's face. While the child may at first dislike the odor of the drug, the relief given soon teaches the patient its value, and he will ask for it when he feels the attacks coming on. If the attack is prolonged and violent, this may be a dangerous treatment, owing to the strained condition of the heart-muscle.

The question has arisen a number of times whether it is possible to chloroform a person who is asleep without his being wakened. This has been decided by numerous tests to be possible, particularly if the sleep be heavy.

Chloroform, when taken internally by the mouth, causes a sensation of warmth in the stomach and a hot, burning taste about the lips and buccal mucous membrane. In overdose it can and has produced death when taken in this manner. Although rarely used in internal medicine, chloroform in the form of the spirit of chloroform (*Spiritus Chloroformi, U. S.*) or water of chloroform (*Aqua Chloroformi, U. S.*) is useful in cough mixtures, which are given to persons having an irritative cough, and in cases where, through nervousness or other cause, tickling in the throat or bronchial tubes keeps the patient continually in a state of unrest. (See Bronchitis.)

In *gastric* or *intestinal flatulence* 1 or 2 drops (0.06–0.10) of pure chloroform, or 10 to 20 drops (0.65–1.30) of the spirit of chloroform, will often give relief. The following prescription is very useful in all forms of abdominal pain and is harmless in ordinary dose:

℞.—Spt. chloroformi . . . . f℥ss (16.0).
Spt. camphoræ . . . . fʒij (8.0).
Spt. lavendul. comp. . . . . q. s. f℥iij (96.0).—M.
S.—Dessertspoonful (8.0) every twenty minutes for 4 doses.

In the treatment of *serous diarrhœa* when combined with astringents and opium the spirit of chloroform is most useful, provided that the irritating cause is first removed. In *renal* or *hepatic colic* a few inhalations, not sufficient to disturb consciousness, will not only give temporary but sometimes permanent relief. Hypodermic injections of 10 to 15 drops (0.65–1.0), reaching down to a *painful sciatic nerve*, have been recommended by Bartholow. Rubbed on the chest in the form of chloroform liniment, this drug will sometimes prevent asthmatic attacks, but it ought not to be inhaled except most carefully, in this disease, because of the strained condition of the right side of the heart. In drachm (4.0) doses chloroform has been used as a remedy for *tape-worm*, but ought never to be so employed.

When placed in liniments of a stimulating character chloroform is a very useful application over muscles affected by soreness and stiffness, as in *lumbago* and *gout*, and these liniments may also be used over *neuralgic* areas for their local anæsthetic effect.

Administration.—The official preparations of chloroform are a liniment (*Linimentum Chloroformi, U. S.* and *B. P.*); a water (*Aqua Chloroformi, U. S.* and *B. P.*), dose ½ to 2 ounces (15.0–60.0); a spirit (*Spiritus Chloroformi, U. S.* and *B. P.*), the dose of which is 20 minims to 1 fluidrachm (1.3–4.0); and an emulsion (*Emulsum Chloroformi, U. S.*), composed of chloroform, gum tragacanth, oil of almonds, and water, given in the dose of 2 to 4 fluidrachms (8.0–15.0). The *B. P.* recognizes, besides those given, the following preparations: *Tinctura Chloroformi Composita*, composed of rectified spirit, chloroform, and cardamoms, dose 20 to 60 minims (1.3–4.0), and *Tinctura Chloroformi et Morphinæ*, dose 5 to 10 minims (0.3–0.65).

CHROMIC ACID.

Chromic Acid (*Acidum Chromicum, U. S.* and *B. P.*) is not a true acid, but an anhydride, and occurs in the form of brilliant red crystals, which are deliquescent and possess a sour, metallic taste. The acid should be kept in glass-stoppered bottles. It should never be mixed with sweet spirit of nitre, strong alcohol, or glycerin, or any organic matter, as under these circumstances it may explode.

Therapeutics.—Chromic acid is used solely as a caustic for the removal and destruction of *growths on the skin or mucous membranes.* The liquid resulting from its deliquescence on exposure to the air may be employed by means of a glass rod if a very severe action is needed. The surrounding tissues should always be protected by lard or adhesive strips.

Dr. J. Wm. White has recorded a death from the application of this acid to a large number of condylomata about the buttocks and vulva. Where the drug has been swallowed the patient should be treated for gastro-enteritis, and dilute alkalies and lime-water be used, as well as emetics and demulcent drinks.

If a superficial action is desired, a solution containing 100 grains to the ounce (6.5 : 32.0) of water is sufficient, and for small warts and similar growths this solution will be found strong enough.

Liquor Acidi Chromici, B. P., is composed of 1 part of acid to 3 of water.

CHRYSAROBIN.

Chrysarobin (*Chrysarobinum, U. S.* and *B. P.*) is a mixture of the proximate principles derived from a powder found in the wood of the tree *Andira Araroba*, which was originally used for medicinal purposes in Brazil. In the East Indies it is called "Goa powder." Chrysarobin is sometimes misnamed chrysophanic acid, and is a yellow, tasteless powder, soluble in solutions of alkalies, in acids, and in ether.

Therapeutics.—Chrysarobin is given internally in the dose of ⅛ of a grain (0.008) in *psoriasis* and *parasitic diseases* of the skin, but more commonly is employed externally in the form of the official ointment (*Unguentum Chrysarobini, U. S.* and *B. P.*), which is too strong for direct use, and should be mixed with 4 or 5 parts of benzoated lard before application to the skin. Even when so diluted chrysarobin may cause great swelling and inflammation of the skin, with desquamation of the cuticle. Should the surface be broken, it may be absorbed and cause vomiting. As the drug stains the skin a dark-brown, it ought not to be used on the face, but should this accident occur the discoloration may be removed by the application of a weak solution of chlorinated lime. In *psoriasis* the following may be employed after the patient has taken a bath to soften the scales:

℞.—Chrysarobini . . . . ʒj (4.0).
Ætheris }
Alcoholis } . . . . āā q. s. ut ft. sol.
Collodii . . . . f℥ij (64.0).—M.
S.—Apply to the part affected with a brush.

CIMICIFUGA.

Cimicifuga (*U. S.*).—This drug is derived from *Cimicifuga Racemosa*, otherwise known as black cohosh or black snake-root. It contains a resin and a volatile oil, upon which its medicinal powers are supposed to depend. The fluid extract and tincture should always be freshly prepared from the fresh crude drug. It is official in the *B. P.* as *Cimicifugæ Rhizoma*.

Physiological Action.—In large doses cimicifuga paralyzes the sensory side of the spinal cord, and in consequence lowers reflex activity. It has no effect on the nerves and muscles. On the circulation the drug acts by depressing the heart and vasomotor system. Death is due to respiratory arrest. In small dose it is a feeble cardiac stimulant. In overdose it nearly always produces frontal headache.

Therapeutics.—Cimicifuga is, after arsenic, the best remedy we have for *chorea*, particularly if the patient is otherwise in good health, but it should be used with careful attention to the regularity of the bowels and often be accompanied by iron. It is also indicated where there is, in addition to St. Vitus's dance, a rheumatic tendency. In *chronic bronchitis* it is asserted to be of value, and in *rheumatism* of a subacute or chronic type cimicifuga sometimes gives relief.

Cimicifuga has been highly praised in the treatment of *neuralgia*, particularly of the ovarian type, and in *amenorrhœa. subinvolution, and tenderness of the womb.* To women who state that they cannot step off a step without paining or hurting the uterus or ovaries cimicifuga often gives relief. Some writers assert that it is an efficient and active heart tonic in cases of *fatty* and *irritable heart* when digitalis fails. There can be no doubt that it is a powerful uterine stimulant, and it ought not to be used during pregnancy for fear of abortion. By reason of this power it may be employed instead of ergot during labor, and is better in some cases, because it produces normal not tonic contractions. In the treatment of *headache* arising from overstraining of the eyes in study cimicifuga is said to do good.

The drug is official in the form of the extract (*Extractum Cimicifugæ, U. S.*), dose 1–5 grains (0.05–0.3), the fluid extract (*Extractum Cimicifugæ Fluidum, U. S.* and *B. P.*), the dose of which is 10 to 30 drops (0.65–2.0) or even 1 drachm (4.0), and the tincture (*Tinctura Cimicifugæ, U. S.* and *B. P.*), the dose of which is 1 to 2 drachms (4.0–8.0).

CINCHONA.

Cinchona, U. S., is a name applied to the bark of all the trees belonging to the genus Cinchona, provided they contain as much as 2.5 per cent. of the alkaloid quinine, or 5 per cent. of total alkaloids. The same barks are included under the name of *Cinchona Cortex* in the *B. P.* There are thirty-one species of this genus, but only a comparatively small number can be included in the list of those which contain 5 per cent. of alkaloid. These are the Cinchona Calisaya, or *Cinchona flava*, which contains the most quinine, the Cinchona Condaminea, Cinchona Micrantha, Cinchona Succiruba, or *Cinchona Rubra, U. S.*, *Cinchona Rubra Cortex, B. P.*, and Cinchona Pitayensis. The first is called yellow bark, the second pale bark, the fourth red bark. The alkaloids of the quinine series derived from these barks are quinine or quinina, quinidine or quinidina, and quinicine, which is an artificial alkaloid. Of the cinchonine series we have cinchonine and its sulphate, cinchonidine, and cinchonicine, which last is also an artificial alkaloid. Besides these alkaloids we have present kinic and kinovic acids and other inert and useless substances.

As quinine is the most important of the group, and as its physiological action is virtually identical with the rest, whatever is said hereafter in this article refers to quinine, unless it is otherwise stated. All the alkaloids of cinchona which have been named are not employed as pure alkaloids, but as salts formed by adding sulphuric, hydrochloric, or other acid to increase their solubility.

Physiological Action.—When quinine is taken in overdose it causes ringing in the ears, dizziness, disorders of taste and smell, disturbance of vision in some cases, and fulness in the head. Deafness often comes on, and is generally, with the roaring in the ears, the most pressing symptom. Headache is not uncommon. (See Untoward Effects.)

NERVOUS SYSTEM.—Upon the cerebrum quinine acts as a stimulant, and finally as a congestant, if given in excessive dose. If poisonous doses are used, intense cerebral congestion ensues, and finally unconsciousness comes on. On the spinal cord of the lower animals the drug first causes a decrease in reflex action by stimulating Setschenow's reflex inhibitory centre, and finally by depressing the spinal cord and nerves. The latter changes occur only after poisonous doses.

CIRCULATION.—If quinine, even in small amount, be injected into the jugular vein of a dog, so that it goes in concentrated form to the heart, cardiac paralysis will result. If this does not occur, the drug simply decreases pulse-force, pulse-rate, and arterial pressure. When given to man in small medicinal doses by the mouth, the drug acts as a general stimulant to the entire body, and so tends to support the circulation, increasing to a slight degree the pulse-rate and blood-pressure. If the dose by the mouth be very large (15 grains), the pulse is depressed. Full doses in fever therefore act as vascular sedatives.

BLOOD.—The blood after poisonous doses is more coagulable than normal, but in medicinal amounts no such effect is produced. The effect of quinine on the blood-corpuscles is of great interest. Even in full medicinal doses it arrests the diapedesis of the white cells from the capillaries by a direct action on these cells, and if the drug be applied to the mesentery of a frog the cells already extruded cease their movement, but the intravascular cells do not. On the other hand, if the quinine be given internally in so small a dose that the proportion to the blood is 1:20,000, the white cells in the vessels cease to migrate, but the ones in the surrounding tissues do not (Binz, Hare, Disselhorst). This is perhaps the explanation of the effects of quinine in acute inflammations, for it arrests inflammatory exudation and allows the extruded cells to wander away from the diseased area. It is stated, however, that this is not the case with all animals. Binz asserts that in the proportion of 1:20,000 quinine diminishes the number of white cells. Medicinal amounts increase the number of red blood-corpuscles very materially in man. It is said that quinine prevents the oxygen-bearing powers of the corpuscles, but this probably does not occur from medicinal doses.

RESPIRATION.—Upon respiration quinine acts as a slight stimulant in small doses, but as a marked depressant in poisonous amounts, death being most commonly due in animals to failure of respiration if it be taken by the stomach in lethal dose. Quinine diminishes gaseous interchange in the body, probably by decreasing the affinity of the hæmoglobin for oxygen (Binz, Bonivitsch, and Rossbach).

TEMPERATURE.—Quinine lowers bodily temperature in health very little if at all, and in fevered states its influence is governed by the cause of the fever. Thus in malarial fevers quinine is a very powerful antipyretic by reason of its peculiar powers over the cause. In fever *before crisis* quinine is of little service, but in that after crisis it causes a rapid fall. Perhaps some of the antipyretic influence is due to the fact that it tends to arrest oxidation.

As an antiseptic quinine has considerable power.

ABSORPTION.—Quinine is absorbed from the stomach, not from the intestine, and it is precipitated by the alkaline juices of the bowel. For this reason it should be given in cachets, capsules, or powders rather than in compressed tablets. If pills are used, only those which have been freshly made should be employed.

KIDNEYS, ELIMINATION, AND TISSUE-WASTE.—Quinine escapes from the body chiefly through the kidneys, although some of it is destroyed by oxidation in the liver and tissues. The process of excretion of quinine is by no means rapid, so far as the entire quantity to be eliminated is concerned. While it may in rare instances be found in the urine in fifteen minutes from the time it is given, it does not disappear from this secretion for about twenty-four hours. In the urine it is found as quinine and as dihydroxyl quinine.

Upon tissue-waste quinine acts as a depressant and decreases the elimination of nitrogenous materials.

DIGESTIVE TRACT.—Quinine has a bitter taste in as small a proportion as 1:10,000.

Upon the stomach quinine acts a tonic and stimulant, and if given too frequently or in large doses may irritate this viscus. Moderate doses are slightly constipating in their effects, and sometimes large doses may induce colicky pain. It acts as a feeble intestinal antiseptic, but does not inhibit the activity of the digestive ferments.

Poisoning and Untoward Effects.—Severe poisoning from quinine very rarely occurs except in persons who have an idiosyncrasy to the drug. Recently Roberts has recorded a case in which a woman, aged thirty-six years, who took 5 drachms (20 grammes), survived after suffering from deep coma, shallow breathing, slow pulse, absolute deafness, and blindness. The loss of sight lasted two weeks, but the retinal changes persisted for several months. Death from an overdose of quinine is practically unknown. Soullier quotes Tarnier and Budin as asserting that enough quinine may be eliminated by the milk to produce death in a nursling.

"Untoward effects" is the best term with which to qualify the disagreeable symptoms which sometimes come on in persons having an idiosyncrasy to the drug and who are in reality poisoned by small doses. In these cases sudden, complete, but temporary blindness is often met with. DeSchweinitz has shown that in dogs quinine produces in toxic doses permanent optic atrophy and thrombosis of the central vein of the retina. He believes that the drug produces local changes in the vessels of the eye (endo-vasculitis). In other instances complete deafness asserts itself, due to congestion of the middle ear, while skin eruptions, generally of the nature of erythema, are not rarely seen. In other instances petechial and vesicular eruptions are developed, and swelling of the gums with a tendency for them to bleed may appear (Schulz). After lethal doses hemorrhage into the middle ear may be found, and severe epistaxis may ensue after so small a dose as 4 grains (0.2). The buzzing in the ears can generally be put aside by the administration of 10 grains (0.65) of bromide of sodium combined with a little ergot. Karamitsas has proved that quinine may produce hemoglobinuria in persons suffering from malarial poisoning, and apparently may even develop bilious remittent fever.[1] Irritability about the neck of the bladder may sometimes be produced by quinine.

Therapeutics.—This drug is employed in medicine to fulfil four great offices, although its influence in other directions is hardly less powerful. These are as an *antiperiodic* or *antimalarial*, as an *antipyretic*, as a *tonic* possessing peculiar virtues, and as a stimulant to the *parturient uterus.*

For many years physicians were forced to employ this drug empirically, not knowing the cause of the disease called malaria. We now know that the theory of Binz, offered as long ago as 1867, is correct, and that malaria is due to the presence of a germ, the plasmodium malariæ, which was first accurately studied by Laveran and named by Marchiafava and Celli. These and other investigators have found that quinine acts as an active poison to these germs, even in so weak a solution as 1 : 20,000.

For the reasons given in the preceding paragraph quinine is the best remedy we have for malarial fever as a prophylactic and cure, and it should be given in doses which are indicated by the state of the patient. (See Malarial Fever.) If possible it should always be preceded by a purge having an hepatic action. This preliminary treatment is particularly important in *bilious* or *remittent* fever. The drug should be given in hourly doses, or in one or two large doses in such a way that its influence is fully felt, not at the time of the expected paroxysm, but about an hour or thirty minutes before that time. If the paroxysm is near at hand, the drug should be given in solution, bitter though it be, in acidulated water.

As a prophylactic against malaria the dose of quinine should be 2 to 4 grains (0.1–0.2) or more three times a day.

In malarial cachexia or hemorrhagic malarial fever quinine generally does more harm than good. Under such circumstances the danger in using quinine consists in irritating the engorged kidneys after the chill has passed by. The quinine is not a hæmostatic, and only does good in malarial hematuria by preventing the paroxysm which will produce the bloody urine. To give quinine after this symptom appears is to "lock the door after the horse is stolen." In hematuria occurring from chronic malarial poisoning without a chill quinine is of no value. Indeed, it would seem certain from the studies of many physicians in America, Greece, and Italy that the use of quinine is capable of developing a hematuria.[1]

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[1] See author's collective investigation, *Therapeutic Gazette* for July, 1892.

In *pernicious malarial fever* quinine should be given by the mouth, by the rectum, and hypodermically, as much as 60 to 70 grains (4.0–4.5) being used at a dose. In *brow ague* or *malarial neuralgia* quinine often acts most usefully, and this is also true in some cases of ordinary nerve-pain not dependent upon a specific disease.

For the reduction of the pyrexia of *typhus* or *typhoid* fever quinine will be found inferior to the new antipyretics, even when given in very large dose, and ought to be used very rarely, if at all, for this purpose. It will seldom cause a fall of temperature before *crisis* or *lysis*, but will aid in the fall very actively after these changes have occurred. In those cases of fever in which the use of quinine is followed by marked improvement the good results are due either to its specific antimalarial influence or to its stimulating influence on the general system.

As a tonic quinine is not only a simple bitter, but also seems to have a direct effect in increasing the number of the red blood-corpuscles. The tonic dose should be 1 to 2 grains (0.05–0.1) three times a day.

Quinine has been used to overcome *uterine inertia* in weak women, but it is a feeble remedy, and is less and less resorted to by progressive obstetricians. Quinine will not of itself cause abortion, but in nervous, hysterical women who have a tendency to abort, and to whom it is necessary to give full doses of quinine during pregnancy, it may be well to combine some sedative, as one of the bromides or opium, with the antiperiodic.

In the *lobar pneumonia* of children quinine should be used in suppositories in the dose of 2 grains (0.1) three times a day.

Acting on the basis that *chorea* is due to lack of inhibitory control of muscular movements, Wood has urged the use of quinine in large doses in this disease as a stimulant to inhibition. Whether the good which sometimes follows this treatment is due to any specific effect of the drug is doubtful.

In cases where prolonged mental or *physical strain* is to be undergone, quinine in the dose of 2 to 4 grains (0.1–0.2) will often prevent exhaustion and support the system.

The internal use of quinine is also a wise procedure in *whooping cough*, and the best dose, according to a careful series of studies by Baron, is 1½ grains (0.075) to each year of the child's age, to be given at 6 A. M., 2 P. M., and 10 P. M.

A very much more agreeable method of pursuing this treatment in whooping-cough is to give the patient the so-called quinine chocolates, which are made of 1 grain (0.05) of tannate of quinine and chocolate. They do not taste of quinine at all if well made.

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[1] See collective investigation of this subject by the author in *Therapeutic Gazette* for July, 1892.

Used in solution in the form of a spray by the atomizer, quinine is of undoubted service in *whooping cough*, and will often prevent the spread of the disease to other children if they be subjected to its use.

This solution should contain from 1 to 2 grains (0.05–0.1) to the ounce (32.0) and be employed every few hours. It is well to remember that quinine is not tasted by the tip of the tongue, but is tasted by the back portion. The tip of the atomizer should therefore be carried well back of the root of this organ, and a 1 per cent. solution of cocaine painted over the dorsum of the tongue in cases where the disagreeable taste of the quinine is objected to very strongly. This solution of quinine used, by means of an atomizer, in *colds in the head* and in *fœtid sore throat* is often of service. Quinine injections in the strength of 1 : 3000 are useful in *amœbic dysentery*, as this drug destroys the amœba coli.

Administration.—When prescribing quinine the physician should employ the hydrochlorate of quinine (*Quininæ hydrochloras, U. S.* and *B. P.*), as it contains a high percentage of alkaloid, and is very soluble. It is stronger in alkaloid than the bisulphate of quinine (*Quininæ Bisulphas, U. S.* and *B. P.*), which is, however, soluble in the proportion of about 1 to 8 of water. The hydrobromate of quinine (*Quininæ Hydrobromas, U. S.* and *B. P.*) is another useful salt, soluble in the proportion of 1 to 16 of water. The valerianate of quinine (*Quininæ Valerianas, U. S.* and *B. P.*) possesses no special value. The sulphate of quinine (*Quininæ Sulphas, U. S.* and *B. P.*), the least soluble of all these salts, is by custom most commonly administered. The tannate of quinine is a salt not so bitter as the other salts, and is weaker in relative alkaloidal strength. One grain (0.05) of the tannate equals about ¼ of a grain (0.015) of pure alkaloid. The bisulphate equals about ⅔ and the sulphate ¾ of a grain of the pure alkaloid.

The dose of all the salts of quinine varies from 1 to 4 grains (0.05–0.15) as a tonic, and from 4 to 60 grains (0.2–4.0) for antimalarial purposes.

In regard to the administration of quinine, it may be said that it ought never to be given in solution if it can be avoided, because of its disagreeable taste. In adults and children it should be used preferably in small capsules and in pills, which may be gelatin- or sugar-coated. Another means for adults is the use of cachets. If pills or capsules are employed, care should be taken that the gelatin is thin and the sugar not hardened by age, for if the pill or capsule escapes into the intestine before it is dissolved the quinine is precipitated and not absorbed. If the case is that of a child too young to take a pill, the drug may be given in the following manner without tasting very disagreeably:

℞.—Quininæ sulph.	gr. xvj (1.0).
Ext. glycyrrhiz. fl.	fʒj (4.0).
Syrupi aurantii cort.	f℥ij (64.0).—M.

S.—A teaspoonful t. d. for a child of three years.

In some cases quinine chocolates may be used, but unless they are well made the after-taste of quinine is well marked. When they are used the tannate of quinine should always be placed in them. In other cases quinine may be used in the suppository in the dose of 2 to 3 grains (0.1–0.15), care being taken that irritation of the rectum does not ensue. For suppositories the best salt to employ is the hydrochlorate.

For hypodermic use the hydrochlorate of quinine should be used most commonly, as it is soluble in about 10 parts of water, and contains more of the alkaloid than the equally soluble bisulphate of quinine. It may be employed in the following manner:

℞.—Quininæ hydrochlorat. . . . . gr. vij (0.5).
Glycerini }
Aquæ dest. } . . . . āā f℥ss (2.0).—M.
S.—Warm solution before using it, and do not add acid.

℞.—Quininæ hydrochlorat. . . . . gr. xv (1.0).
Alcoholis . . . . ♏xv (1.0).
Aquæ dest. . . . . f℥jss (6.0).—M.
S.—Add a few drops of hydrochloric acid to complete the solution before using.

If the bisulphate is used hypodermically, to its solution should be added a little tartaric or sulphuric acid to prevent precipitation of the drug in the alkaline juices of the connective tissues before it can be absorbed. The tartaric acid should be present in the proportion of about 1 grain (0.05) to each 5 grains (0.3) of the quinine. Should it be necessary to use the sulphate of quinine hypodermically, 10 grains (0.65) should be added to 1 drachm (4.0) of water and sulphuric acid added, drop by drop, until the salt is dissolved. The hydrobromate of quinine, the solubility of which is about 1 to 54 of water, may also be used hypodermically, as may also the bimuriate of quinine and urea (*Quininæ Bimuriatica Carbamas*), which, however, is scarcely more than half as strong in quinine as the other salts.

The best place to give the hypodermic injection is in the buttock, between the trochanter and the tuberosity of the ischium. Injections into the calf of the leg are very painful.

In Italy, Baccelli has resorted to the intravenous injection of quinine in pressing cases of malarial infection. He employs the following solution for this purpose:

℞.—Quininæ hydrochlorat. . . . . gr. xv (1.0).
Sodii chloridi . . . . gr. xv (1.0).
Aquæ dest. . . . . f℥ijss (10.0).—M.
S.—This should be injected, after distilled water has been added to it, into a vein of the leg rather than into a vein of the arm. The solution should be boiled and filtered before using, and used while warm.

As quinine in a concentrated form is a powerful heart-depressant, the injection should be given *very slowly indeed* into a vein of the leg when intravenous injections are employed.

The alkaloids of cinchona other than quinine which are commonly used in medicine are cinchonidine, cinchonine, quinidine, and the impure substance chinoidinum.

Cullen, Sinkler, and De Brun have all found the sulphate of cinchonidine (*Cinchonidina Sulphas*, *U. S.* and *B. P.*) very useful in malaria, and it is less bitter and more soluble than is quinine. Sinkler states that it does not produce the severe head symptoms caused by quinine.

The dose of quinidine sulphate (*Quinidinæ Sulphas*, *U. S.*) is about twice that of quinine, as is also that of cinchonine sulphate (*Cinchoninæ Sulphas*, *U. S.* and *B. P.*) and cinchonidine sulphate (*Cinchonidina Sulphas*, *U. S.* and *B. P.*).

Chinoidinum is a resinous mass obtained in the preparation of the alkaloids of cinchona, and contains amorphous alkaloids. It possesses distinct antiperiodic power, and was used freely when quinine was a very expensive drug. Its dose is three or four times that of quinine.

The liquid preparations of cinchona are the infusion (*Infusum Cinchonæ*, *U. S.*), dose a wineglassful (32.0); the tincture (*Tinctura Cinchonæ*, *U. S.* and *B. P.*), one or two teaspoonfuls (4.0–8.0); and the compound (Huxham's) tincture (*Tinctura Cinchonæ Composita*, *U. S.* and *B. P.*), a teaspoonful to a tablespoonful (4.0–16.0). Huxham's tincture is a most efficient and elegant bitter tonic in debility and convalescence from low fevers. It is too weak in alkaloids to be used in malarial poisoning. Under the name of elixir roborans, or Whytt's tincture, a similar mixture is employed for precisely the same purposes. The other liquid preparation is the fluid extract (*Extractum Cinchonæ Fluidum*, *U. S.* and *B. P.*), dose 5 to 15 drops (0.3–1.0). A solid extract (*Extractum Cinchonæ*, *U. S.*) is also official in the dose of 5 to 10 grains (0.3–0.65). The *B. P.* preparations not official in the *U. S. P.* are as follows: *Decoctum Cinchonæ*, dose 1 to 2 fluidounces (32.0–64.0); *Infusum Cinchonæ Acidum*, dose 1 to 2 fluidounces; *Tinctura Quininæ Ammmoniata*, dose ½ to 2 fluidrachms (2.0–8.0); *Vinum Quininæ*, dose ½ to 1 fluidounce (16.0–32.0).

Contraindications.—Quinine is contraindicated in gastritis, cystitis, meningitis, epilepsy, cerebritis, middle-ear disease, because it congests, irritates, or stimulates those areas which are diseased, and in those cases which have an idiosyncrasy to its action.

CINNAMON.

Cinnamon (*Cinnamomum Cassia vel saigonicum vel zeylanicum*, *U. S.*, *Cinnamomum Cortex*, *B. P.*) is the inner bark of a plant, a native of Ceylon or of the species indigenous to China. It contains a volatile oil and tannic acid. In overdose the oil acts as a soporific and kills by failure of respiration.

Therapeutics.—Cinnamon is used, as are all the drugs of its class, for flavoring, as a *carminative*, and as an intestinal stimulant in *serous diarrhœas*. It has the peculiar power of acting as a hæmostatic in *uterine hemorrhage* where the flow is oozing and not active, thereby differing from the other volatile oils, with the exception of that of erigeron. The oil of cinnamon is a powerful antiseptic, which can be used in dilute form in the dressing of wounds and by injection in *gonorrhœa*. J. Chalmers DaCosta employs a spray of oil of cinnamon and benzoinol in the proportion of 1, 2, or 3 drops (0.05–0.15) of the oil to 1 ounce (32.0) of benzoinol, or it may be used by injection. It seems to act best in the early stage of gonorrhœa.

Cinnamic acid, a derivative of oil of cinnamon, is also used for the same purposes.

Administration.—The dose of the oil (*Oleum Cinnamomi, U. S.* and *B. P.*) is 1 to 5 drops (0.06–0.3); of the water (*Aqua Cinnamomi, U. S.* and *B. P.*), a wineglassful (32.0) or less; of the spirit (*Spiritus Cinnamomi, U. S.* and *B. P.*), 5 to 30 drops (0.3–2.0); of the tincture (*Tinctura Cinnamomi, U. S.* and *B. P.*), ½ to 1 drachm. Under the name of *Pulvis Aromaticus, U. S.* (*Pulvis Cinnamomi Compositus, B. P.*) a carminative powder, consisting of cinnamon 35 grams, nutmegs 15 grams, cardamoms 15 grams, and ginger 35 grams, is official. It is useful in the treatment of the flatulence of adults and children. The latter should take about 10 grains (0.7) at a dose, an adult 30 grains (2.0).

CITRATE OF POTASSIUM.

Citrate of Potassium (*Potassii Citras, U. S.* and *B. P.*) is a white, granular, deliquescent salt, almost neutral in reaction and very soluble in water. It is by far the most agreeable of all the salts of potassium to the taste. In the early stages of *bronchitis* it is of the greatest value when combined with ipecac (see Bronchitis), and it is also useful as an alkaline diuretic. In *bronchitis* the dose should be 20 grains (1.4) every four hours, and in *urinary incontinence* due to acid and concentrated urine the dose should be equally large.

Under the name of neutral mixture (*Mistura Potassii Citratis*), made by adding to 1 pint (½ litre) of lemon-juice enough bicarbonate of potassium to neutralize it, we have a useful febrifuge drink in *fevers*, particularly those of childhood. The dose is ½ to 1 ounce (16.0–32.0) every few hours.

Liquor Potassii Citratis, U. S., is made in the same manner as is the neutral mixture, except that citric acid is substituted for the lemon-juice (citric acid 6 grm., potassium bicarbonate 8 grm., and water 100 cc.).

The neutral mixture is the better preparation of the two, but more expensive. A very refreshing and agreeable way of prescribing this drug is in the form of "effervescing draught," made by mixing two solutions which are prepared as follows: 1. Lemon-juice and water, equal parts, enough to make 4 ounces (128 gm.). 2. Bicarbonate of potassium 1 drachm (4.0) and water 3 ounces (96.0). These solutions are to be mixed in the quantities desired, and taken while effervescing. If lemon-juice is not at hand, a solution of citric acid of the strength of 2 drachms (8.0) to 4 ounces (128.0) of water should be employed in its stead.

Under the name of *Potassii Citras Effervescens* the U. S. P. of 1890 calls for an official powder possessing the advantages of the mixture just named.

CITRIC ACID.

Citric Acid (*Acidum Citricum, U. S.* and *B. P.*) is chemically identical with the acid of the lemon, but has not identical influences over the body with lemon-juice.

Not only does the lemon owe its acidity to this acid, but most of the other edible fruits, such as strawberries and raspberries, depend upon its presence for their acidity.

Therapeutics.—Citric acid is used in *scurvy*, or *scorbutus*, as a prophylactic and cure. For some unknown reason, pure lemon-juice seems to benefit these cases more than citric acid itself, and it is therefore to be preferred to the latter whenever it can be had. In order to keep lemon-juice from decomposition on long voyages, it should be boiled, and poured while hot into bottles until it nearly reaches to the cork; the remaining space is then filled with a thin layer of sweet oil and the bottle corked and stood upright. Under these circumstances the juice may be kept indefinitely.

In *rheumatism*, either *acute* or *chronic*, lemon-juice may be employed in the dose of 1 to 2 ounces (32.0–64.0) four times a day, well diluted, or 2 drachms (8.0) of citric acid may be given. The acid is also of value in *hepatic inactivity and catarrhal jaundice*. (See Citrate of Potassium.)

The preparations containing citric acid are *Syrupus Acidi Citrici, U. S.*, *Succus Limonis, B. P.*, and *Syrupus Limonis, B. P.*

CLOVES.

Cloves (*Caryophyllus, U. S.; Carophyllum, B. P.*) are the unexpanded flowers of the *Eugenia aromatica*, a plant of the East and West Indies. They possess an aromatic odor and the pungent taste of a typical spice. They contain a volatile oil (*Oleum Carophylli, U. S.* and *B. P.*), which is yellow when fresh, but very dark-colored when old.

Therapeutics.—Cloves or their oil are used in medicine for the purpose of acting as a *carminative*. They are also employed as a stimulant and tonic to the stomach to prevent griping during an attack of *diarrhœa*, or that caused by purgatives, to act as a flavoring agent, as a counter-irritant, and, finally, as a *parasiticide* and local *anæsthetic*.

The oil of cloves possesses great power for good in many cases of pulmonary tuberculosis, partly by its germicidal influence upon the bacillus. It should be given in the dose of 5 minims (0.3) in capsules after food three or four times a day, and a hypodermic injection of sterilized sweet oil, containing in each dose of 30 drops (2.0) 5 minims (0.3) of the oil of cloves, should be administered once a day. The injection should be given into the subcutaneous tissues of the flank or abdomen, and is painful, but the decrease in the cough and expectoration amply repays the patient for the pain.

Like all volatile oils, this oil is an efficient local application for *pediculus pubis* and similar parasites, and it may be used in *toothache*, because of its anæsthetic powers, if placed on a pledget of cotton in the cavity of a tooth. In the treatment of *myalgia* or *muscular rheumatism* oil of cloves is often placed in a liniment for its counter-irritant effect. In overdose it acts as a soporific, and kills by failure of respiration and the production of marked gastro-enteritis. Minute doses of ½ to 1 drop (0.03–0.06) of the oil in a little water will sometimes control *excessive vomiting*. In addition to the oil the *B. P.* has an official infusion, *Infusum Caryophylli*, the dose of which is 1 to 2 fluidounces (32.0–64.0).

COCA AND COCAINE.

Erythroxylon Coca is official in the *U. S.* and *B. P.* as Coca, but in the *U. S. P.* of 1880 it was known as *Erythroxylon*. Cocaine (*Cocainæ Hydrochloras*, *U. S.*) is the alkaloid derived from *Erythroxylon Coca*, a shrub of Peru and Bolivia. When cocaine is heated with hydrochloric acid it is split up into several substances, amongst others a base called ecgonine, which has entirely different powers from cocaine, and is perhaps responsible for some of the evil effects which have resulted from poorly prepared cocaine. It is to be distinctly understood that Erythroxylon Coca is not the same as chocolate or Theobroma Cacao.

Physiological Action.—Coca and its alkaloid cocaine, when taken internally, produce a sense of exhilaration and pleasure. Often the amount of muscular and mental power is temporarily increased under their influence. When locally applied to a mucous membrane, cocaine causes a blanching followed by marked congestion.

NERVOUS SYSTEM.—The dominant action of cocaine, when locally applied to the peripheral sensory nerves, is to paralyze them. When taken internally it stimulates the brain to an extraordinary degree, but exercises no effect upon the sensory nerves. Sometimes its internal use produces a decrease of sensation, which Mosso believes to be due to an influence on the spinal cord. This effect is, however, very feeble. If the dose be a poisonous one, convulsions of cerebral origin ensue, and are both clonic and tetanic in type.

The sensory nerves are paralyzed by enormous doses both when the drug is directly applied and when it is taken internally.

Upon the muscles, when taken internally, Mosso has proved the drug to be a direct stimulant, and it is particularly active after starvation or fatigue. Muscular power is increased temporarily by cocaine.

CIRCULATION.—Cocaine acts as a stimulant to the heart and circulation in moderate amounts, but its effects are not marked except in poisonous dose.

RESPIRATION.—The drug acts as a powerful respiratory stimulant, producing in large dose a great increase in the rapidity of the respiratory movements, but in poisonous dose it kills by failure of respiration associated with exhaustion from the accompanying convulsions.

TEMPERATURE.—Cocaine raises bodily temperature to a very extraordinary degree if given in overdose, this rise being due to an increase of heat-production (Reichert). In moderate or medicinal amounts it has no effect.

KIDNEYS, ELIMINATION, AND TISSUE-WASTE.—The drug is eliminated by the kidneys, but is chiefly destroyed by oxidation in the body. The quantity of urine passed is increased under its influence, and the nitrogenous elements eliminated in this fluid are a little diminished.

EYE.—Owing to its powerful action as a local anæsthetic, cocaine has been used largely in diseases of the eye, and it is particularly efficacious in this organ because of the delicacy of the conjunctiva, which it can readily penetrate and so paralyze the peripheral nerve-endings. The anæsthesia comes on in from one to five minutes after the use of the drug, according to the strength of the solution used. It is accompanied by very marked dilatation of the pupil, which Köller asserts is due to the fact that the drug constricts the blood-vessels of the iris and leaves the muscular fibres untouched. Ophthalmologists, however, generally assert that it stimulates the peripheral ends of the sympathetic nerve. It is important to remember that this dilatation, unlike that produced by mydriatics, such as atropine, is not accompanied by paralysis of accommodation. The drug does not cause a forcible mydriasis, and is never used for the prevention of adhesions in iritis unless combined with atropine.

Therapeutics.—Cocaine hydrochlorate (*Cocainæ Hydrochloras*, *U. S.* and *B. P.*) is used as an anæsthetic in the eye in the dose of from 3 to 5 or more drops of a 1 to a 4 per cent. solution. The strength of 2 and 3 per cent. is perhaps most commonly employed.

The conditions indicating its use in the eye are all operations of a painful character, be they what they may, and it can also be used for the relief of pain when an *acute inflammation* or foreign body is causing suffering.

The following formula will be found useful in these states:

℞.—Cocainæ hydrochlor. . . . . gr. viij (0.53).
Acid. boric. . . . . gr. vij (0.46).
Aquæ dest. . . . . f℥j (32.0).—M.
S.—Use with a dropper in the eye every half hour until relieved.

Cases of keratitis are recorded in which cocaine has produced permanent corneal opacities, and it may cause dryness and roughening of the corneal epithelium even in the normal eye.

Cocaine is often used in 2 per cent. solution upon *cracked nipples* just before nursing to relieve pain. The drug must be carefully washed off before the baby is put to the breast. It is asserted, however, by Guenel and Desamaux that this treatment may permanently stop the flow of milk.

Owing to the density of the mucous membranes of the vagina and rectum, cocaine has little effect upon them unless used in 10 per cent. solution and profusely applied. In the mouth cocaine may be used in cases of *stomatitis* where a spot is to be cauterized, in *pharyngitis*, and in *soreness and tenderness of the gums*. While it gives much temporary relief in *pharyngitis*, the subsequent effects are often exceedingly disagreeable, the congestion looking more angry and being more painful than before, and the experience of the writer indicates that it will only act in a curative manner if applied before the capillaries become relaxed or paralyzed by the severity of the inflammatory process. In *coryza* and *hay fever* a powder consisting of cocaine, morphine, and bismuth in the proportion of 1 part each of the two alkaloids and 5 parts of the bismuth will often be of service if snuffed up into the nostrils. If cocaine be applied to a large nerve-trunk, amputation of the tributary limb may be performed without pain, but so large an amount of the drug must be used that there is great danger of poisoning the patient.

Cocaine is generally used at present in the place of ether in cases requiring *amputation of the fingers* or in cases of minor surgery where the drug can be confined to the part injured. A tight cord should be bound around the base of the finger and a 4 to 8 per cent. solution injected into the part, a ligature about the base of the digit being used to prevent hemorrhage and the systemic absorption of the drug. After the operation is concluded slight hemorrhage should be allowed to occur, to sweep out the drug and thereby avoid systemic medication. Not more than ¼ grain of cocaine should be injected.

Under the name of "*infiltration anæsthesia*" Schleich has introduced a method of destroying sensation in localized areas which often gives good results for minor operations. He injects into the skin, as superficially as possible, a sufficient amount of a solution of common salt, cocaine, and morphine to produce local œdema, and thereby pressure on the nerve-filaments, which are also depressed by the cold liquid coming in contact with them. He also believes that the local anæmia so caused aids in destroying sensation. The injection is given so gently that a sort of wheal or œdematous spot is produced where the incision is to be made. As soon as this spot is developed the needle is inserted into its margin and carried under the skin farther, and the injection is repeated. In this way the line of an extensive incision can be anæsthetized progressively. If deep incisions are necessary, the injections are given into the deeper tissues as well. The injections must always be made into the healthy skin, as if it is diseased a slough may result. Schleich asserts that similar injections under the periosteum permit of operations on the bones. The anæsthesia will last twenty-six minutes. The solution is of three strengths, as follows:

Solution.	I.	II.	III.
Cocaine hydrochloride . . .	gr. iv (0.2).	gr. ij (0.1).	gr. ⅕ (0.01).
Morphine hydrochloride . .	gr. ½ (0.025).	gr. ½ (0.025).	gr. $\frac{1}{10}$ (0.005).
Sodium chloride	gr. iv (0.2).	gr. iv (0.2).	gr. iv (0.2).
Sterilized distilled water. . .	fʒiv (120.0).	fʒiv (120.0).	fʒiv (120.0).

To each of these solutions 3 drops of a 5 per cent. solution of carbolic acid is added. The second solution is the one commonly used. The first is commonly employed where acute inflammation is present, and the third where repeated injections are necessary.

It is worth remembering that cocaine is soluble in fats, whereas its salts are not. Cocaine itself should therefore be used in anæsthetic salves.

Internally, cocaine or the fluid extract of coca may be used as a supportive and stimulant in low fevers, and in cases where great physical and mental strain is to be borne. Thorington has found cocaine of very great value as a stimulant and anti-emetic in *yellow fever*. In the *vomiting of pregnancy* and other forms of *excessive emesis* it is of great service by depressing the gastric sensory nerves and thereby decreasing the irritability of the stomach.

Cocaine is undoubtedly of service in the opium habit, but if largely used soon changes the patient from a case of morphiomania to a "coca fiend."

The dose of the fluid extract (*Extractum Cocæ Fluidum*, *U. S.* and *B. P.*) is from ½ to 2 drachms (2.0–8.0); that of cocaine, from ¼ to ½ grain (0.015–0.03). The other *B. P.* preparation is *Lamellæ Cocainæ*, each disk containing $\frac{1}{100}$ grain (0.0006) of cocaine hydrochlorate.

The *cocaine habit* is a condition unfortunately often met with since the introduction of the drug into therapeutics. It is often combined with the morphine habit, and sometimes is employed as a substitute for that morbid state. The symptoms of the cocaine habit consist of marked loss of flesh, disorders of the circulatory system, mental failure and delusions, sometimes resembling those of chronic alcoholism. Often hallucinations come on which are generally of a disagreeable type. The habit is difficult to cure, for relapses are frequent. The sudden withdrawal of cocaine from a patient may result in profound collapse.

According to Magnan, a pathognomonic symptom of chronic or subacute cocaine-intoxication is a sensation of a crawling worm or bug under the skin.

Untoward Effects.—Sometimes loss of speech, blindless, nausea and vomiting, syncope, and unconsciousness have followed the internal use or local application of cocaine. Eplileptiform convulsions have also been noted, while the circulation and respiration have been disordered in every possible manner. In many of these cases the urine passed after the poisoning is copious, very limpid, and contains albumin. Curiously enough, a large number of cases of severe poisoning have followed the injection of cocaine into the urethra previous to some operation for the relief of chronic gonorrhœa or stricture.

The hypodermic injection of cocaine as a stimulant sometimes causes vomiting.

The treatment of the poisoning consists in the use of ammonia, coffee, strychnine, or ether and alcohol if the symptoms are those of depression. If they are convulsive in type, then the treatment to be instituted is identical with that of strychnine-poisoning (which see).

Out of 250 cases of accidental poisoning arising from the medicinal use of the drug, 13 have been fatal.

CODEINE.

Codeina, *U. S.* and *B. P.*, is an alkaloid prepared from opium, and is often contaminated by morphine. The sulphate of codeine is generally used, as it is more soluble than codeine itself.

Physiological Action.—Codeine resembles morphine very decidedly in its physiological action, the chief difference being that it possesses less narcotizing power, but in large amount more readily produces tetanus and final paralysis of the peripheral motor nerves in the lower animals (Dott and Stockman). It does not arrest secretion in the respiratory and intestinal tract, as does morphine, and therefore seldom produces constipation.

Therapeutics.—Codeine has been highly recommended in France as a nervous quietant, and in this country in *nervous cough* or in cases where the cough is excessive in *bronchitis* and *phthisis*. In *diabetes mellitus* some clinicians have found it of the greatest value, while others have been disappointed in its use. It should, however, always be tried in this disease, in the hope that it may exercise a favorable effect. When given for cough it should be used in the dose of from ½ to 2 grains (0.03–0.12) three or four times a day; generally placed in the syrup of wild-cherry bark. When given for diabetes the dose should be much larger, beginning at 1 or 2 grains (0.05–0.1), and rapidly increasing to 20 or 30 grains (1.3–2.0) or more, given three times daily.

COD-LIVER OIL.

Oleum Morrhuæ, *U. S.* and *B. P.*, sometimes called *Oleum Jecoris Aselli*, is a fixed oil obtained from the fresh livers of the *Gadus Morrhua*, or cod-fish. There are several species of cod from which the oil is obtained other than the one named, but this is the chief source of supply. The oil is pale or dark according to its degree of freedom from foreign materials. Although the paler oils are generally prescribed, there can be little doubt that the darker ones are more medicinally active. The most prominent inorganic constituents of the oil are iodine, bromine, and sulphuric and phosphoric acids. It also contains more or less of the biliary salts.

Physiological Action.—Cod-liver oil depends on a number of substances for its peculiar effect. The iodine certainly exerts definite alterative powers, and the oil seems peculiarly adapted to digestion and absorption, for cod-liver oil passes through animal membranes very readily, probably owing to the biliary salts contained in it.

It aids in the maintenance of bodily temperature by its oxidation, and causes a deposit of fat in the tissues. The oil also seems to influence the blood directly, for clinical observation shows that anæmic persons become healthy-looking under its use, and Cutler and Bradford have found that this apparent improvement is a physiological fact by the use of Malassez's blood-cell-counting apparatus, the red corpuscles being always increased. It has been proved by experiment that cod-liver oil is more readily oxidized than any other oil.

The belief among physicians that the effects of cod-liver oil are dependent upon some peculiar combination of substances has shown itself in the attempts of physiological chemists to isolate the combination. One of the best results reached is the so-called "morrhuol" of Chapoteau, who seems to have isolated a crystalline substance containing phosphorus, iodine, and bromine: 3 to 5 grains of this preparation are said to represent 1 drachm of the pure oil, and it is certainly of value as a medicament in most of the states in which we use the oil itself. In "colds" which "hang on" and are not readily gotten rid of morrhuol is best given in capsule or pill. This substance is put on the market in gelatin-coated pills or capsules.

Therapeutics.—Cod-liver oil is useful in persons who have no *tubercular lesion* in the lung or other tissues, but have mucous membranes which are readily susceptible to disease. This state has been called the *pre-tubercular stage of phthisis.* Cod-liver oil possesses no curative power in cases of well-developed or rapid phthisis, and its administration in many cases only serves to nauseate the patient or to produce an oily diarrhœa through failure of digestion. It does good in the early part of the disease in that it acts as a food peculiarly suited to a wasting malady, and its mild alterative effects are also of value. It does not act as a cure. In *chronic rheumatism* the drug is often of great service, particularly if the disease is largely muscular. *Strumous skin lesions* depending for their existence not only upon *scrofulosis*, but also upon *anæmia*, often yield to its use. In *enlargement of the lymphatic glands*, where they are not undergoing acute active suppuration, cod-liver oil does good. This is a statement requiring explanation. By acute active suppuration is meant the early formation of pus or the molecular death of the parts—not the slow formation characterized by no active change, but represented by cold abscess or old sores. If the suppurative process is chronic, the oil does good by aiding in maintaining the patient's nutrition. In cases of *strumous ophthalmia* cod-liver oil is of great service. In advanced *syphilis* cod-liver oil is most useful, and in the early stages of *rickets* it ought always to be employed. In *marasmus*, when used by inunction or taken internally if the stomach will stand it, it is one of the best drugs we have. If a few grains of bile-salts, consisting of glycocholate and taurocholate of sodium, be added to each drachm of oil, it will be very ready absorbed from the skin when applied by rubbing.[1]

In *sciatica* and *lumbago* and in *neuralgia* cod-liver oil is of service. In *emphysema of the lungs* it is said to be of great value, and certain writers commend its use in *gout*, although others have asserted that it is of no value. Sometimes old persons, whose digestion is not disordered and who have no organic brain disease, complain of *giddiness.* The best treatment for this condition, in many instances, is cod-liver oil with small doses of quinine, or if these fail wine of ergot and one of the bromides may be used.

Administration.—Owing to its disagreeable taste and smell most patients rebel against taking cod-liver oil; but this can, with a little persistence, be readily overcome, so that finally the patient may not object to the remedy, but actually like it. This is particularly true of young children. The secret of reaching this much-to-be-desired state lies in the use at first of doses which may be dropped into a teaspoon and the spoon then gently submerged in a glass of milk. The oil floats off into the milk in a globule in the centre of the tumbler. and if the milk be rapidly gulped down without the oil touching the sides of the glass, it will not be tasted. The first gulps must be large enough to include the oil. The oil may be taken on a full stomach. but as a general rule it is best digested if taken about two or three hours after meals, when the gastric contents are about to be passed into the small bowel, where the oil is digested; and if it be immediately followed by a little pancreatin, its digestion will be much aided. Other modes of ingestion consist in the placing of the oil in whiskey or brandy, in the manner which has been described with milk, and this method possesses the advantage that the alcohol by its stimulating effect aids very distinctly in the digestion of the oil. Sometimes a pinch of salt placed in the mouth before and after the oil is taken aids in covering its taste and in its digestion. (See Indigestion.) Oil of eucalyptus in the proportion of 1 to 100 of the cod-liver oil will cover the latter's taste, but many dislike the eucalyptus more than the cod-liver oil. The addition of an equal quantity of glycerin, with ½ to 1 drop (0.03–0.06) of the oil of bitter almonds to each dose, is often of service. Syrup of bitter orange-peel is one of the best covers to its taste. Tomato ketchup has also been used with good results. Chewing a piece of smoked herring before and after taking the oil is of value to disguise the taste in some cases. The oil is readily taken in soft capsules holding from ¼ to 1 drachm (1.0–4.0). Very few people are unable to swallow such capsules if they are first made slippery by dipping them in water.

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[1] These salts may be bought, or made as follows: To about 300 cc. of ox-gall is added nearly thrice that quantity of ordinary alcohol, and the flask shaken thoroughly. All the mucus is now precipitated and the supernatant fluid is filtered. To the filtrate is added a large excess of sulphuric ether, and after a time a plaster-like mass forms at the bottom of the vessel, which slowly becomes crystalline. These crystals are now placed on a filter-paper and washed with a mixture made up of ether and alcohol, equal parts. The filter-paper is dried and the substances then seen are the taurocholate and glycocholate of sodium. Having carefully removed these salts from the paper, they are ready for use.

Cod-liver oil is most readily digested when given in single nightly doses after supper or after a light meal just before going to bed. After a few days it may be given after dinner, and in the course of a week after breakfast. If the patient is once nauseated by overdoses, it is almost impossible to make the stomach retain the oil. If it cannot be digested, a drachm of ether aids in its absorption, or a drink of whiskey or brandy may be used instead. Often a simple bitter, such as a dessertspoonful (8.0) of compound tincture of cardamom, taken in water immediately after the oil is swallowed, aids in its digestion.

A large number of preparations of cod-liver oil are on the market in emulsion, pancreatized, and purified till they are nearly tasteless. Many of the permanent or perfect emulsions contain more Iceland moss or acacia than oil. A very useful preparation is the egg-emulsion made by one large manufacturing concern, as it contains no acacia and 40 per cent. of the oil. One of the preparations widely advertised in the street-cars of Philadelphia as "tasteless" has been shown to contain no oil at all. The pancreatized emulsions are the best if the oil is really present in sufficient quantity to do good, as the very fact of its being artificially digested adds to its value and makes it possible to put more oil into the emulsion. Oil devoid of smell is probably devoid of medicinal value, as all the peculiar properties have been "purified" out of it.

Quite recently it has been suggested that cod-liver oil be given by the rectum, a full dose of pancreatin being mixed with it to increase its assimilability. Sometimes creosote is placed in this injection in 5- to 10-drop(0.35–0.65) doses.

COFFEE.

(See CAFFEINE.)

COLCHICUM.

Colchicum is the corm (*Colchici Cormus*, *B. P.*; *Colchici Radix*, *U. S.*) and seed (*Colchici Semen*, *U. S.*; *Colchici Semina*, *B. P.*) of the *Colchicum Autumnale*, or Meadow Saffron, a plant of Europe, containing an alkaloid, colchicine, which may be still further changed into colchiceine. While the drug is official in the form of the seeds and root, the former are rarely employed.

Physiological Action.—Colchicum is a very powerful drug, and when locally applied is an irritant to the skin. Taken internally in overdose, it also irritates the gastro-intestinal mucous membrane.

According to the studies of one of the writer's students—Dr. Ferrer y Leon—the drug has little or no effect when given in moderate dose on the nervous system, circulation, respiration, or temperature, only producing changes in these parts when given in poisonous doses. In full doses it greatly increases the flow of bile, and may cause bilious vomiting and purging. Jacobi asserts that death is produced by respiratory failure, the heart continuing to beat for many minutes after respiration ceases. The violent gastro-enteritis which is present in colchicum poisoning in man certainly has much to do with the usual fatal result.

Therapeutics.—The employment of colchicum in medicine centres around its use in *gout* and similar states, such as *chronic rheumatism*. Indeed, it is almost a specific in *acute gout*, provided that it be pushed until it causes slight griping or laxity of the bowels. Colchicum does not seem to possess any marked beneficial effect in preventing attacks. Indeed, while it relieves one attack it often seems to hasten the onset of the next. In *acute gout* it is usually well to unload the bowels by a small dose of compound extract of colocynth, with some hyoscyamus added to it to stop griping. Thus

℞.—Ext. colocynth. comp. . . . . . gr. x vel xx (0.65–1.3).
Ext. hyoscyami . . . . gr. ij (0.12).—M.
Ft. in pil No. iv.
S.—One as soon as threatened by an attack.

This pill is particularly needed if constipation be present and the belly is hard. If the abdomen is soft, it should not be given. After this has acted colchicum may be given. Thirty to 40 drops (2.0–2.65) of the wine of the root should be given, and 20 drops more in twelve hours. In some cases of *subacute* or *chronic gout* or *chronic rheumatism* iodide of potassium should be used in conjunction with the colchicum. The following may be ordered:

R.—Potassii iodidi . . . . ʒss vel ʒj (2.0 vel 4.0).
Vini colchici radicis . . . . fʒiss (6.0).
Vini alb. . . . . q. s. f℥iij (90.0).—M.
S.—Tablespoonful (15.0) three times a day after meals; shake well.

The use of colchicum in such doses as to cause severe purgation or emesis is dangerous, and ought not to be resorted to. Colchicine can be used successfully against gout in the dose of $\frac{1}{100}$ to $\frac{1}{60}$ (0.0006–0.001) of a grain.

Poisoning.—The symptoms of poisoning by colchicum are nausea, griping, agony in the belly, purging followed by the passing of thick mucus, with great and increasing tenesmus, profuse salivation, collapse, and death from exhaustion and gastro-enteritis. Bloody purging is almost never seen. The poisoning is one of the most painful, slow, and hopeless poisonings known, and a man taking as much as an ounce of the wine of the root or the seed is almost inevitably doomed to a terrible death. Tannic acid may be used as a partial chemical antidote, and the stomach washed out by the administration of emetics and the use of the stomach-pump. Opium is to be used to relieve the pain and irritation, and oils are to be given to soothe the inflamed mucous membrane. If collapse comes on, external heat and stimulants are to be used, and atropine may prove of service under these circumstances.

Administration.—Colchicum ought never to be used in substance, but should be employed in the form of wine of the root (*Vinum Colchici Radicis, U. S.*) in the dose of 10 to 20 drops (0.6–1.2), although if a marked effect is required 30 drops (2.0) may be used. The extract (*Extractum Colchici Radicis, U. S.*) is given in the dose of 2 to 3 grains (0.12–0.2), and the fluid extract (*Extractum Colchici Radicis Fluidum, U. S.*) in the dose of 2 to 4 minims (0.1–0.3).

Of the seeds, the tincture (*Tinctura Colchici Seminis, U. S.* and *B. P.*) is given in 30- to 90-minim (2.0–6.0) doses; the wine (*Vinum Colchici Seminis, U. S.*) in the same amounts; and the fluid extract (*Extractum Colchici Seminis Fluidum, U. S.*) in the dose of 2 to 5 drops (0.1–0.3). The *B. P.* preparations, in addition to those given, are *Vinum Colchici*, dose 10 to 30 minims (0.6–2.0); *Extractum Colchici*, dose $\frac{1}{2}$ to 2 grains (0.03–0.13); and *Extractum Colchici Aceticum*, dose $\frac{1}{2}$ to 2 grains (0.03–0.13).

Colchicine is given in pill in the dose of $\frac{1}{100}$ to $\frac{1}{60}$ grain (0.0006–0.001).

COLLODION.

Collodium, U. S. and *B. P.*, is a solution of gun-cotton or pyroxylon in alcohol and ether, and is a clear, syrup-like fluid, smelling strongly of ether.

Therapeutics.—Collodion is used as an air-tight dressing for *small* *wounds* and *abrasions* and for rendering small dressings waterproof. A difficulty in its use consists in the contraction which takes place as it dries, which draws and puckers the part sufficiently to cause not only discomfort, but acute pain. It should be applied with a camel's-hair brush over the part affected.

In *boils*, when they are beginning in a small pustule or papule with an inflamed zone, collodion painted over the spot will generally abort the disease. If the boil has burst, this treatment is useless, but if it has not the pus should not be liberated, but allowed to become inspissated. By this treatment and by the frequent application of a coat or two the local trouble eventually disappears. Of course this rule only applies to certain cases, and if pain is caused by the retention of the pus, it must be evacuated with antiseptic precautions. In smallpox the flexible collodion may be used to prevent pitting.

In *gouty inflammations* of the joints an application of collodion mixed with iodine, equal parts, will often remove the pain, although at first the suffering may be increased by this treatment.

Flexible Collodion.

Flexible Collodion (*Collodium Flexile*, *U. S.* and *B. P.*) is made by adding Canada turpentine 5 parts and castor oil 3 parts to ordinary collodion. It does not contract or become hard, and is generally to be preferred to ordinary collodion in the dressing of wounds.

Styptic Collodion.

Styptic Collodion (*Collodium Stypticum*, *U. S.*) contains tannic acid, and is employed to control *small hemorrhages*. It is seldom used, and its employment is a dirty way of controlling bleeding.

Cantharidal Collodion.

Cantharidal Collodion (*Collodium Cantharidatum*, *U. S.*) has been referred to under the head of Cantharides. *Collodium Vesicans*, *B. P.*, is identical with this preparation, and is used for the same purpose.

COLOCYNTH.

Colocynthis, *U. S.*, is the fruit of the *Citrullus Colocynthis*, a plant at present largely grown in all parts of the world. It contains an alkaloid, colocynthine, and a resin. Neither of these is ever used in medicine. Colocynth causes large watery evacuations, and may, in very large dose, produce fatal gastro-enteritis. It is official in the *B. P.* as *Colocynthidis Pulpa*.

Therapeutics.—Colocynth is never used alone, but always in combination with other drugs of its class as a *hydragogue cathartic*.

In cases of *chronic dropsy* and for the relief of *serous effusions* this drug is generally given in the form of the compound extract of colocynth (*Extractum Colocynthidis Compositum*, *U. S.* and *B. P.*), which contains 160 grms. of colocynth, 500 grms. of purified aloes, 140 grms. of the resin of scammony, 60 grms. of cardamom, and 140 grms. of soap. In the dose of 5 to 20 grains (0.3–1.3) this acts as a powerful watery purge useful in dropsy. The extract (*Extractum Colocynthidis*, *U. S.*) is given with other drugs in the dose of 2 to 5 grains (0.13–0.3) as a purge. The following is a useful form in which to administer it:

℞.—Extract. colocynth. . . . . gr. xxx (2.0).
Extract. belladonnæ . . . . gr. ij (0.1).
Extract. nucis vomicæ . . . . gr. ij (0.1).—M.
Ft. in pil. No. x.
S.—One each morning.

Colocynth is one of the principal ingredients in compound cathartic pills (*Pilulæ Catharticæ Compositæ*, *U. S.*) Each pill contains: compound extract of colocynth, 1⅓ grains (0.09); extract of jalap and calomel, of each 1 grain (0.06); gamboge, ¼ grain (0.015). This pill is not to be used constantly, as it eventually makes the bowels more constipated than before. The U. S. P. of 1890 also orders a pill (*Pilulæ Catharticæ Vegetabiles*, *U. S.*) which contains compound extract of colocynth, extract of hyoscyamus, extract of jalap, extract of leptandra, resin of podophyllin, and oil of peppermint. This is given in the dose of 1 to 2 pills.

The preparations of the *B. P.* not official in the *U. S. P.* are: *Pilula Colocynthidis Composita*, composed of colocynth-pulp, aloes, scammony, sulphate of potassium, and oil of cloves, dose 5 to 10 grains (0.3–0.65); *Pilula Colocynthidis et Hyoscyami*, dose 5 to 10 grains (0.3–0.65).

CONDURANGO.

Condurango is the bark of *Condurango Blanco*, a tree of Colombia, South America. It was introduced into medicine in 1873 as a cure of *gastric cancer*, and at one time had a favorable reputation. We now know that, so far as the morbid growth is concerned, its action is valueless, but there is no doubt that it diminishes the severity of the symptoms in many cases by exercising a sedative effect on the gastric mucous membrane. It also tends to relieve the accompanying gastric catarrh through its action as a stomachic.

The bark is never employed as the bark, but in the form of the fluid extract, dose 1 to 2 drachms (4.0–8.0), or the wine, dose ½ to 1 ounce (15.0–30.0). Sometimes it is given in the form of a decoction made by adding 1 part of the bark to 8 parts of water, which is given in the dose of 1 tablespoonful (2.0) three times a day. Often it is wise to add to the prescription a little hydrochloric acid to take the place of the natural acid of the stomach, which is always lacking in such cases.

CONIUM.

Conium (*U. S.*) is the leaves and fruit of the *Conium maculatum*. The plant grows in Europe and the United States, and contains a resin known as coniine. This drug is official in the *B. P.* as hemlock-leaves (*Conii Folia*) and hemlock-fruit (*Conii Fructus*).

Physiological Action.—Conium in full medicinal dose produces a feeling of relaxation and loss of muscular power, and if the dose be very large it causes giddiness, staggering, and disordered vision, with failure of the circulation.

NERVOUS SYSTEM.—Conium depresses the motor nerves, and, if the dose be extraordinarily large, the sensory nerves. Upon the spinal cord it exerts a feeble depressing influence, but has no positive effect, while the fact that consciousness continues almost up to death shows that the intellectual portion of the cerebrum escapes its influence.

CIRCULATION.—The action of the drug upon the circulation is depressant. It causes at first a fall of arterial pressure, then, if the dose be large, a rise, due to the asphyxia caused by nervo-muscular failure of the respiratory apparatus. Finally, a constant fall of pressure takes place.

RESPIRATION is depressed, because of the paralytic influence of the drug on the nerve-trunks supplying the respiratory muscles.

Therapeutics.—Conium holds an unimportant place in the drug-list of to-day. It has little value except in spasms due to *irritation of a nerve-trunk*, when it may be of service. In *spasms* of cortical or spinal origin other drugs should be used, as it is evident that conium has really no effect in quieting the central nervous protoplasm, but only prevents the impulses which are sent out from manifesting themselves in movements of the muscles. The powdered leaves or other preparations may be smeared over poultices to relieve the pain of *ulcers* and *cancers*, and they certainly do good in such instances.

Administration.—The dose of the alcoholic extract (*Extractum Conii, U. S.*) is from $\frac{1}{2}$ to 1 grain (0.03–0.06), and of the fluid extract (*Extractum Conii Fluidum, U. S.*) 2 to 6 drops (0.1–0.3). The dose of the tincture (*Tinctura Conii, B. P.*) is 10 to 30 drops (0.65–2.0). Coniine is a liquid alkaloid which should never be used. The dose would be about $\frac{1}{60}$ of a grain (0.001). The dose of the hydrobromide of coniine is said by Helbing to be $\frac{1}{6}$ to $\frac{1}{2}$ a grain (0.01–0.03). The preparations in the *B. P.* made from the leaves are: *Cataplasma Conii*, for external use; *Extractum Conii*, dose 2 to 6 grains (0.13–0.4) or more; *Succus Conii*, dose 30 minims to 2 fluidrachms (2.0–8.0) or more; *Vapor Conii*, for inhalations; and *Pilula Conii Composita*, composed of extract of hemlock and ipecac, dose 5 to 10 grains (0.3–0.6). Vapor Conii consists of the juice of hemlock (Succus Conii) $\frac{1}{2}$ ounce (16.0), liquor potassa 1 drachm (4.0), and distilled water 1 ounce (32.0). 20 drops (1.2) of this mixture are placed in hot water in an inhaler, and so employed for the relief of irritative coughs or spasmodic asthma.

It is to be remembered that the variability of the drug, so far as power is concerned, is very great—so great as to make it unreliable. For this reason a small dose should be given at first and the amount gradually increased.

Poisoning.—A prominent symptom of poisoning by conium is dropping of the eyelids (ptosis), due to paralysis of the oculo-motor nerves, and staggering and inability to walk. Its treatment consists in the use of strychnine as a respiratory and nervous stimulant, the employment of external heat, and the use of cardiac stimulants if the circulation fails. The stomach is to be emptied by emetics or the stomach-pump before the antidotes are used.

CONVALLARIA.

This drug is derived from the rhizome and root-stalk of *Convallaria majalis.* It is employed in medicine as a cardiac tonic to fulfil the indications which direct us in the use of digitalis. While by no means so valuable a drug as foxglove, it sometimes acts better in an individual case than the older remedy. The heart is not greatly slowed by it, but the drug is particularly useful in cases of arhythmia and "cardiac hurry."

The dose of the fluid extract (*Extractum Convallariæ Fluidum, U. S.*) is from 4 to 8 drops (0.2–0.5) three times a day. The tincture (*Tinctura Convallariæ*) is given in the dose of 5 to 20 minims (0.3–1.3). Convallamarin is a glucoside of convallaria which has been used in the dose of ½ a grain (0.03) three times a day. Some clinicians think it ought to be given but once a day on account of a danger of cumulative action.

COPAIBA.

The *Copaiba* of the *U. S. P.* and *B. P.* is really the balsam or the oleoresin of *Copaifera Langsdorffi*, and is a clear, transparent liquid of oily consistency, of a pale-yellow color and a peculiar odor. From it is distilled an oil (*Oleum Copaibæ, U. S.* and *B. P.*) which is of little value.

As copaiba is an oleoresin, the term "oleoresin of copaiba" is often used to distinguish it from the oil.

Therapeutics.—Copaiba is used for the purpose of stimulating the mucous membranes of the genito-urinary tract, particularly when they are depressed after a period of inflammation, as in the later stages of *gonorrhœa.* In cases suffering from *chronic urethritis* with anæmia and debility the following prescription is useful:

℞.—Oleoresinæ copaibæ . . . . ʒj (4.0).
Oleoresinæ cubebæ . . . . gtt. iv (0.2).
Ferri et ammonii citratis . . . . gr. xx (1.3).—M.
Ft. in capsulis No. x.
S.—One t. d. after meals.

Copaiba is employed in *subacute and chronic bronchitis* as an expectorant. In the treatment of subacute *pyelitis*, *cystitis*, and *dysentery* it is of value. In *dropsy* due to slow renal changes it will often be of service.

Administration.—Copaiba itself is given in the dose of 5 to 20 minims (0.3–1.3) in capsule or in emulsion. The oil of copaiba

(*Oleum Copaibæ, U. S.* and *B. P.*) is given in capsule or emulsion, preferably in the former, in the dose of 10 to 20 minims (0.65–1.3) two to four times a day. Sometimes it is dropped on sugar and so administered. *Massa Copaibæ, U. S.*, is made by rubbing up copaiba with magnesium, but this is a useless and clumsy way of using it in the pill form.

The drug is eliminated in the urine, and gives the test for albumin with nitric acid.

In some cases it causes urticaria, which soon disappears on the withdrawal of the drug.

COPPER.

Cuprum is never used in the form of the metal itself, but chiefly as the sulphate, which appears in commerce as a blue, clear, somewhat efflorescent salt. It is soluble in 4 parts of cold water, 2 of boiling water, but is not soluble in alcohol.

Physiological Action.—Copper sulphate, when locally applied to a mucous membrane, acts as a powerful astringent, or on the surface of an ulcer as a mild and superficial caustic. Upon the nervous system in cats it acts as a depressant poison when given hypodermically, finally causing death from respiratory failure. When given in overdose by the stomach it causes death by violent gastro-enteritis and exhaustion. The symptoms do not generally come on for an hour, and consist in burning pain in the stomach, a copperish or metallic taste in the mouth, followed by vomiting of bluish liquids and glairy mucus. With the vomiting, purging comes on, the passages at first containing the contents of the intestine, and finally mucus and blood. Convulsions of an epileptiform character are present, and constant and profuse salivation is not infrequent. After death fatty degeneration of the liver and kidneys has been noticed, and it is not at all uncommon for jaundice to appear after the first twenty-four hours, if the patient survives so long. This jaundice is dependent upon changes in the blood. The treatment of the poisoning consists in the primary use of the chemical antidote, which is the *yellow prussiate of potassium*, and the administration of emollient or demulcent substances, such as sweet oil and white of eggs, followed instantly by emetics or the stomach-pump. If emesis and purgation are already active, emetics are of course contraindicated, and counter-irritation is to be employed over the stomach and intestines in the shape of a mustard plaster of moderate strength, and opium given to allay irritation and relieve pain.

Chronic copper poisoning is almost never seen, and, although the metal is widely used for coloring canned green vegetables, it seems to be harmless when ingested in such small amounts.

Therapeutics.—Sulphate of copper (*Cupri Sulphas, U. S.* and *B. P.*), in the dose of 5 to 7 grains (0.3–0.4) may be used as a rapidly-acting *emetic* which only acts upon the stomach, not the vomiting centre. As it is irritant, the emetic dose ought not to be repeated, but if emesis does not occur the sulphate of zinc or mustard should be used in its stead. Indeed, it may be said of sulphate of copper that it should never be given as an emetic, except in phosphorus poisoning, when it acts as the chemical antidote. Even here its use must be most cautious, for Thornton has proved in the Laboratory of Experimental Therapeutics of the Jefferson Medical College that an antidotal dose of copper sulphate given to a dog poisoned with phosphorus may produce death before the phosphorus can cause a lethal result. In pill form it is sometimes given in *diarrhœas* depending upon ulceration of the bowels. The dose should be ¼ to 1 grain (0.015–0.06) combined with opium.

In some states of the body, particularly in *skin diseases of the dry type* and in persons with *tubercular tendencies*, copper seems to act like arsenic, and may be used in minute doses of $\frac{1}{10}$ of a grain (0.006) or less three times a day where arsenic is not well borne. In small doses it is said to be a direct stimulant to the tissues, and to increase the firmness of the flesh and strength of the normal man. Very recently strong claims for copper as a remedy for *anæmia* have been put forward, particularly if it is employed as the arsenite of copper, when the action of the arsenic and copper together produces a good effect.

Locally applied, sulphate of copper is useful, in the solid form or in powder, in the treatment of indolent ulcers. In *chronic conjunctivitis* or in cases of *tinea tarsi*—that is, tinea on the margin of the eyelids—a crystal of the sulphate may be drawn over the diseased spot; or a weak solution of 1 to 3 grains (0.06–0.18) to the ounce (32.0) of water may be dropped into the eye in *subacute conjunctivitis.*

In *relaxed sore throat*, as a gargle, in the strength of 4 grains (6.2) to the ounce, it is often of service. Nitrate of copper (*Cupri Nitras, B. P.*) and acetate of copper (*Cupri Acetas*) serve the same purpose as the sulphate.

CREOSOTE.

Creosote (*Creosotum*, *U. S.* and *B. P*), as employed in medicine, should always be derived from the destructive distillation of beechwood and be designated "beechwood creosote." Much of that sold is derived from coal-tar, and is far less useful. Chemically, creosote is almost identical with carbolic acid. Clinically, it is very different. Beechwood creosote should be of a reddish-amber hue and about as thick as olive oil. Its physiological action is almost identical with that of carbolic acid, and in poisoning by creosote the same antidotes as are employed in carbolic-acid poisoning—namely, soluble sulphates —should be used, as has been proved in experiments by the author. Creosote contains 60 per cent. of guaiacol and 40 of cresol, not creosol. Guaiacol is sometimes used in place of creosote in the dose of 1 to 2 minims (0.06–0.13). (See Guaiacol.) Creosote is a powerful antiseptic.

According to the studies of Imbert, creosote is eliminated chiefly by the kidneys in the form of guaiacol sulphate and creosol sulphate of potassium. Elimination does not go on very rapidly, for this investigator did not find it completed for about twenty-eight hours. A small amount of the drug is eliminated by the lungs.

Therapeutics.—During the past few years creosote has been largely prescribed in *phthisis* and *chronic bronchitis*, and some of the results reached by its use have undoubtedly been of value. It has also been inhaled from sponges with great relief, and even has been injected into the lungs by the trachea or through the chest-wall. (See article on Tuberculosis.) In the treatment of *chronic bronchitis* creosote may be placed in boiling water and inhaled in the steam. Under these circumstances it at least relieves the fœtor of the breath, and this method often gives more rapid relief than any other measure in ordinary subacute inflammation of the bronchi. The beginning dose when the drug is given internally is 2 to 5 drops (0.1–0.35).

Creosote is useless, so far as producing a cure is concerned, if tuberculosis is more than incipient, and ought not to be employed if it disorders the stomach. The drug is contraindicated in phthisis if fever or hæmoptysis be present, but in those patients who have little fever and a rather slow development of the disease creosote often proves of very considerable advantage. The most favorable subjects for its employment are those in whom there is, in addition to parenchymatous changes in the lungs, marked bronchial catarrh, with a profuse secretion of mucus. In such cases the following prescription may be used:

℞.—Creosoti (beechwood) . . . . fʒiij (12.0).
Tinct. gentian. comp. . . . . f℥j (32.0).
Spt. vini rectificati . . . . f℥viij (256.0).
Vini Xerici . . . . Oij (1 litre).—M.
S.—A tablespoonful in a wineglassful (16.0 : 64.0) of water three times a day.

Unless the patient is fastidious, the creosote may be dropped into half a glass of milk and taken in this three times a day. Often as much as a drachm can be given by gradually producing tolerance through ascending doses; and it is worthy of note that in most instances large doses are required if satisfactory results are to be obtained.

Inhalations of the drug often give relief in the advanced stages of phthisis, and decrease the cough, allay the laryngeal dryness, and aid expectoration. When creosote is given hypodermically in phthisis, it should be given in the following formula:

℞.—Creosoti . . . . fʒij (8 0).
Olei amygdal. dulcis . . . . fʒij (8.0).—M.
S.—10 minims (0.65) to be injected deeply into tissues below the scapula.

This method is not to be employed except in rare cases.

In the treatment of *subacute laryngitis* a fine spray of 1 to 2 minims (0.05–0.1) of creosote, 4 grains (0.2) of menthol, and 1 ounce (32.0) of alboline is of service used several times a day, or a mixture composed of creosote 10 minims (0.65), chloroform spirit 10 minims (0.65), and alcohol 20 minims (1.3) may be placed on an inhaler and inhaled.

Creosote is a very valuable remedy in cases of indigestion with fermentative changes in the gastric contents when these arise from the deficient digestion of meats or the use of sweets, when given in the dose of ½ to 2 minims (0.03 to 0.1) after meals, preferably in tablet or capsule. Applied on a pledget of cotton to the cavity of a tooth, creosote often relieves *toothache* by virtue of its anæsthetic influence over peripheral sensory nerves. Sometimes creosote is given in pancreatized cod-liver oil by enema, from 5 to 15 drops being so given to children with *pulmonary* or *peritoneal tuberculosis.*

While ordinary medicinal doses of creosote rarely cause disagreeable symptoms, except some disorder of the stomach or bowels when it is pushed in full doses, the physician who is ordering large amounts should be always on the lookout for toxic symptoms. These consist in vertigo, headache, and a tendency to stupor, and the urine may become smoky in appearance, as in carbolic-acid poisoning. If any of these signs of overdosing appear, the drug must be reduced in dose or stopped altogether.

The preparations of creosote are *Aqua Creosoti, U. S.* and *B. P.*, given in the dose of 1 to 3 fluidrachms (4.0–12.0); *Mistura Creosoti, B. P.*, dose 1 to 2 fluidounces (32.0–64.0); *Unguentum Creosoti, B. P.*, for local application; and *Vapor Creosoti, B. P.*, used by inhalation.

CREOSOTE CARBONATE.

Creosote carbonate, sometimes called "Creosotal," is a combination of creosote with carbonic acid. Over 90 per cent. of creosote carbonate is said to be creosote. It is a thick, oily fluid of an amber color, with but little taste or odor. It is insoluble in water, alcohol, and glycerin, but is soluble in 95 per cent. alcohol, in ether, chloroform, and in cod-liver and olive oils. It is said to be less irritating to the stomach than creosote. The drug is dissolved and absorbed chiefly in the intestine. The dose of creosote carbonate is identical with that of creosote itself, and it is used for the same purposes. It is best given in capsules in olive oil. (See Guaiacol Carbonate.)

CREOLIN.

Creolin is a liquid cresol, a coal-tar product, possessing marked antiseptic but comparatively slight poisonous properties. In appearance it is a dark-brown fluid, and is derived from soft coal. It is of the consistency of syrup. When added to water it forms a white cloud and mixes thoroughly, forming an emulsion up to 12 per cent. of the drug.

Therapeutics.—Creolin is used as an antiseptic in the lying-in state, as a *wash for the hands*, and for *vaginal irrigation.* It cannot be used as a solution in which to place instruments, as it makes so opaque a mixture with water as to prevent their being seen when lying at the bottom of the dish. When used as a vaginal douche it should be employed in the strength of 2 per cent. One of its properties which is of value is that it forms a slippery coating over the maternal parts during parturition. In the treatment of *cystitis* in the female, Parvin highly recommends it as a vesical wash in the strength of a 1 per cent.

solution, or, after the bladder becomes accustomed to its use, in a 2 per cent. solution. According to Kretzschmar and others, a solution of 1 to 500, used with a syringe, is useful in *otorrhœa*, 1 to 100 in *nasal ulcers*, and 1 to 1000 as a nasal douche in *rhinitis* when there is much discharge with the formation of crusts. Creolin has also been used as an injection in the proportion of 5 parts in 1000 of water for dysentery and entero-colitis with success.

In the eye Alt has used with good results a 1 to 2 per cent. solution in the treatment of *blepharitis*, *keratitis*, and *phlyctenular ophthalmia*.

CROTON CHLORAL.

Croton Chloral, or *Butyl Chloral Hydras*, *B. P.*, has a physiological action closely allied to chloral itself, but possesses more analgesic power and is very much less depressant to the heart and circulation. The dose for the production of sleep is the same as chloral, 5 to 20 grains (0.3–1.3) in syrup.

Therapeutics.—Croton chloral is preferable to chloral in sleeplessness due to pain.

In *facial neuralgia* and *migraine* it is exceedingly efficacious, particularly if the fifth nerve be involved. In *headaches* due to *eye-strain*, and in those associated with *sick stomach*, but not due to gastric indigestion or nervous debility, croton chloral is of service. Curiously enough, it is valueless in toothache, but does good in the *neuralgia due to decayed teeth.*

Administration.—Croton chloral should be used in pill form in the dose of 3 to 5 grains (0.2–0.3) every two hours till the pain is relieved or sleep comes on, or it may be given in solution or syrup of acacia and water, or water and glycerin. It has been used in as large a dose as 60 grains (4.0), but 20 to 30 grains (0.65–2.0) ought to be the maximum dose as a general rule.

CROTON OIL.

Croton oil (*Oleum Tiglii*, *U. S.*; *Oleum Crotonis*, *B. P.*) is an exceedingly irritant oil derived from *Croton Tiglium*, a small tree of India. The oil is pale yellow and of a complex character. Applied to the skin for any length of time, it is an intense irritant, producing blisters or pustules. 1 drop (0.06), placed on the tongue with 5 drops (0.35) of sweet oil, acts as a violent watery purge, and, owing to the smallness of its dose, it is frequently employed to *revulse* the *unconscious*, as in *cerebral congestion*. In delirium it is used for the same purpose, and may be given to maniacs who are suffering from an attack of cerebral congestion or obstinate constipation, owing to the smallness of its dose and rapidity of action. The dose is 1 drop (0.06) placed on the tongue with sweet oil or given in emulsion or in pill. It ought never to be used when there is any irritation of the stomach or bowels. As a counter-irritant it is sometimes applied over a tender nerve or to the chest in the treatment of *bronchitis*, in the proportion of half-and-half with sweet oil. Thus applied, it may be absorbed and cause purging. The treatment of poisoning by croton oil is identical with that of gastro-enteritis. (See Gastro-enteritis.) *Linimentum Crotonis* is a preparation of the *B. P.* which is employed as a counter-irritant liniment for *sprains* and in *muscular rheumatism.*

CUBEBS.

Cubebs (*Cubeba*, *U. S.* and *B. P.*) are the unripe fruit of *Piper Cubeba*, a plant of Java. They consist in wrinkled or rough black bodies about the size of small peas, and have an aromatic pungent taste. They contain a volatile oil, cubebic acid, and cubebin. The drug should not be kept in powdered form, as it loses its powers, but should be powdered as needed. Overdoses of cubebs cause gastro-intestinal and genito-urinary inflammation.

Therapeutics.—Cubebs are used in the advanced stages of *gonorrhœa* where a tendency to a chronic discharge is present. Some surgeons have used them in the early stages as an abortive treatment, but this is a bad practice. In *cold in the head* the powdered berries may be snuffed up the nostril, provided that the stage of secretion is well established. They ought not to be used before this stage. In the treatment of *chronic* or *subacute bronchitis* the oleoresin of cubebs is very useful in some cases (see Bronchitis), and in the form of cubeb cigarettes the drug is much used as a remedy for hoarseness due to subacute laryngitis.

Administration.—Cubebs may be given in powder in the dose of 10 to 60 grains (0.65–4.0), in the fluid extract (*Extractum Cubebæ Fluidum*, *U. S.*) 10 to 30 drops (0.65–2.0), and in the form of the tincture (*Tinctura Cubebæ*, *U. S.* and *B. P.*) in the dose of 10 drops to ½ an ounce (0.65 : 16.0).

The dose of the oleoresin (*Oleoresina Cubebæ*, *U. S.* and *B. P.*) is 2 to 20 drops (0.1–1.3) three times a day, and it may be given in capsules or emulsion. The troches of cubebs (*Trochisci Cubebæ*, *U. S.*) are used for the relief of *pharyngitis* of a chronic type. The dose of the oil (*Oleum Cubebæ*, *U. S.* and *B. P.*) is 5 to 20 minims (0.3–1.3).

CUSSO.

Cusso, *U. S.* and *B. P.*, sometimes called Kousso, is derived from *Brayera Anthelmintica*, a plant of Abyssinia. In the *U. S. P.* of 1880 it was called Brayera. It contains a volatile oil, tannic acid, and koosin or tæniin. The drug is used against the *tape-worm*, and is most valuable as a vermifuge, also possessing the advantage of safety. It should be used in an infusion (*Infusum Brayeræ*) in the dose of ½ an ounce (16.0) of the powdered flowers to a pint (500 cc.) of water, and be taken in the morning on an empty stomach. (See Worms.) Koosin may be used in the dose of 20 to 40 grains (1.3–2.5) in capsule. The fluid extract (*Extractum Cusso Fluidum*) is given in the dose of ½ an ounce (16.0). It has been said that the drug is apt to cause abortion in pregnant women, but this is not known to be a fact. *Infusum Cusso*, *B. P.*, is given in the dose of 4 to 8 fluidounces (128.0–256.0).

CYANIDE OF POTASSIUM.

Cyanide of Potassium (*Potassii Cyanidum*, *U. S.* and *B. P.*) is used in the same way and for the same purpose as hydrocyanic acid. (See Hydrocyanic Acid.) The dose is $\frac{1}{12}$ to $\frac{1}{10}$ of a grain (0.006).

The following prescriptions may be used in cases suffering from *bronchitis* or *phthisis* accompanied with excessive cough:

℞.—Potassii cyanid. . . . . gr. ij (0.1).
Morphinæ sulph. . . . . gr. j (0.05).
Acid. sulph. arom. . . . . fʒij (8.0).
Syr. pruni virginianæ . . . . . q. s. ad f℥iij (96.0).—M.
S.—Teaspoonful (4.0) three times a day.

Or as follows:

℞.—Potassii cyanid. . . . . gr. ij (0.1).
Ammon. chloridi . . . . ʒij (8.0).
Acid. hydrochlor. dil. . . . . fʒj (4.0).
Elix. calisayæ . . . . q. s. ad f℥iij (96.0).—M.
S.—Teaspoonful (4.0) three or four times a day.

DERMATOL.

(See Bismuth Subgallate.)

DIASTASE.

The word diastase is applied to substances found in certain of the digestive juices of the animal body and present in processes connected with grain when fermented, as, for example, in the manufacture of alcoholic beverages. Whatever diastase may be in one sense, we recognize that it belongs to the same class of enzymes as pepsin and the like, and it has the power of converting starch into sugar. Many preparations of malt contain some diastatic power, but there is only one preparation of diastase, which possesses no other property save that of aiding the digestion of the starches—namely, one prepared originally by a Japanese investigator, Takamine, and called from his name "Taka-diastase." It is used to relieve cases of *indigestion* of the starchy foods in the dose of 2 to 5 grains after meals, in tablets or capsules or in a solution.

DIGITALIS.

Digitalis, *U. S.*, is the leaves of *Digitalis purpurea*, or foxglove, of the second year's growth. The leaves are official in the *B. P.* as *Digi-*

talis Folia. It contains a number of substances, no single one of which acts as do preparations of the crude drug. In other words, all these compounds must act together to be therapeutically active. Among the substances so far isolated from digitalis by chemists may be named digitalin, digitalein, digitoxin, digitin, and digitonin. Several of these are simply compounds of the others. Digitalin, so called, occurs in two forms, amorphous and crystalline. The crystalline digitalin (French) is largely digitoxin, while the amorphous is composed of digitonin, digitalein, and digitalin. A pure digitalin has been isolated, but it cannot be obtained in the ordinary market. Digitoxin and pure digitalin are the two most active principles yet found. None of these substances should be used in medicine to take the place of digitalis.

We have already pointed out in the early part of this volume the necessity of employing reliable drugs. In the instance of digitalis this is particularly important, because the cases in which it is used are often serious, and because digitalis varies greatly in strength. As a rule, the wild digitalis is stronger than the cultivated, and the English or German digitalis better than the American. The preparations of digitalis should therefore be obtained from a first-rate manufacturing house.

Physiological Action.—Digitalis is apt to irritate mucous membranes which are already slightly out of order, and for this reason should not be given by the mouth in cases of gastritis and allied states if it can be avoided.

NERVOUS SYSTEM.—The action of digitalis upon the nervous system is only manifested when poisonous doses are used. Small toxic doses decrease reflex activity by stimulating Setschenow's reflex inhibitory centres in the medulla, and finally by depressing the spinal cord. Convulsions are sometimes seen as a result of the action of decomposition products of digitalis—namely, toxiresin and digitalresin. Finally, the motor nerve-trunks themselves are depressed and the muscles are paralyzed.

CIRCULATION.—Upon the circulatory system digitalis exerts its chief influence. In moderate or medicinal amounts it increases the pulse-force and arterial pressure, slows the pulse, and increases the size of the pulse-wave. The increase of pulse-force is due to a stimulating influence exercised upon the cardiac ganglia and the muscular fibres of the heart; the rise of arterial pressure is caused by the increase in pulse-force and pulse-volume, and by a stimulation of the vasomotor centre and the muscular coats of the blood-vessels, whereby a contraction occurs in the walls of the arteries and arterioles. The slow pulse is produced by stimulation of the pneumogastric centre and the peripheral ends of the vagus verves. The increase in the volume of the pulse is due to this influence on the vagi, for, the pneumogastric nerves being stimulated, the diastole of the heart is more full and complete and occupies a greater length of time. The result of this delay is that the ventricles become thoroughly distended, and on contracting drive out a much larger wave of blood through the aorta than is normally sent out. This is important to remember when using the drug in heart disease and other states. While we do not know that the vagi are the trophic nerves of the heart, we have a large amount of evidence in favor of such a view, and it has long been thought that digitalis was not only a heart stimulant, but a heart tonic. If the trophic nerves of the heart are stimulated by digitalis, it at once becomes evident that it is a doubly useful remedy.

When very full medicinal doses of digitalis are given, or when poisonous doses are ingested, the action of the heart becomes exceedingly irregular, hobbling, and dicrotic. (See Poisoning.) What the cause of this irregularity is we do not know. It is certainly not due to weakness, for the cardiac beats, when they occur, are in themselves more forcible than in health. The probable explanation of this peculiar cardiac irregularity lies in a disturbance of the co-ordinating apparatus of the various parts of the heart muscle. By this the author does not refer to the so-called co-ordinating centre of Kronecker and Schmey, which probably does not exist, but to the changes which may take place in the so-called "contraction wave," which is found to begin in the normal heart at the great veins and passes from them through the auricular walls to the walls of the ventricles. It has been found by Wooldridge and by Tigerstedt that if the auricle and ventricles be separated by a ligature or clamp, they still continue beating, but no longer do so synchronously, or, in other words, the centres of each set of walls act independently of the others. The irregular action of the heart under digitalis is probably dependent upon a disassociation of these centres; and this theory is still further substantiated by the experiments of Roy and Adami, who have proved that independent contraction of the various parts of the heart can be produced by stimulation of the peripheral end of the cut vagus, a part of the nerve which is stimulated by digitalis in the large doses which we have been considering. In man we frequently see this irregular pulse replaced by an exceedingly rapid pulse, which is shuttle-like in character; and whether the pulse be irregular or rapid, the arterial pressure is always low, owing, first, to the imperfect action of the heart, and, second, to a depression of the vasomotor centres and the muscular coats of the blood-vessels. The rapid pulse, when it occurs, is probably due to a depression of the peripheral ends of the vagus nerves.

In the frog digitalis nearly always causes, when given in full doses, an arrest of the heart in systole, but in man and the higher animals the arrest is in diastole.

If a patient who has taken a poisonous dose be suddenly raised up, he may drop dead, owing to the disturbance of the contraction-wave in the heart produced by the erect posture. Under these circumstances the heart beats so abortively that the circulation fails.

RESPIRATION.—Digitalis has almost no effect on this function unless the amount be poisonous, when respiration is slowed.

TEMPERATURE.—Upon the normal bodily temperature digitalis has little or no effect in medicinal dose. In poisonous dose it lowers temperature. In fever the drug seems to cause a slight fall with some constancy, but it can rarely be used for any antipyretic influence. *High temperatures prevent digitalis from slowing the pulse*, because, as proved by Brunton and Cash, fever depresses the vagus centres in the medulla, and also probably, when the temperature is very high, the peripheral ends of the vagus. This is an important point to be remembered in the therapeutic use of this drug.

KIDNEYS, TISSUE-WASTE, AND ELIMINATION.—Digitalis has almost no effect over the kidney structure itself, and does not to any extent stimulate the renal epithelium. The cause of the increased urinary flow produced by digitalis in cases of cardiac dropsy depends upon the removal of congestion of the kidneys and the increased arterial pressure and improved circulation brought about by the drug.

It is important to remember that digitalis, if given in overdose, may cause a spasm of the blood-vessels of the kidney, and so cause suppression of urine. This is usually followed by the development of cumulative effects.

Upon tissue-waste digitalis seems to have little effect, but there is still some discrepancy in the reports as to the amount of urea cast off under its use, some investigators saying it is increased, others that it is diminished.

We do not know how the drug is eliminated, as chemists have never been able to find it in the urine. It is probably oxidized in the body.

Poisoning.—The slow, full pulse, followed by the hobbling, dicrotic, shuttle-like pulse-beats, and the angry, tumultuous cardiac beat against the chest-wall, afford a combination of symptoms characteristic of the over-action of digitalis. The pulse may be full and slow when the patient is lying down, but at once becomes irregular on his sitting up.

Often when the patient has by error received too much of the drug the finger can scarcely note any pulse at the wrist, yet the ear when placed over the heart shows it to be beating wildly, as though it would break out of the chest. It is important that the weak pulse at the wrist be not taken as the only guide as to the state of the patient for this very reason, and the physician should always auscult the præcordium before reaching an opinion as to the action of digitalis.

As the poisoning progresses vomiting may come on, exophthalmus occurs, and a peculiar blue pearliness of the sclerotic coat of the eye is seen. Consciousness is generally preserved nearly to the last. Death from digitalis poisoning may be put off for days or occur in two hours or even less. Headache is often a severe symptom.

TREATMENT OF POISONING.—Tannic acid is to be given as a chemical antidote; emetics and the stomach-pump are to be used, the former only when the drug has not yet been absorbed, for if the heart is much affected emetics are dangerous. External heat is to be applied, particularly about the abdomen; the maintenance of a horizontal position must be insisted upon for several days after active symptoms have passed by, for sudden death on sitting up has occurred. The use of tincture of aconite, as the physiological antidote, is resorted to.

Therapeutics.—Much unfortunate misunderstanding concerning the action of digitalis has arisen, and, while some call it a circulatory stimulant, others think it a circulatory depressant. The first class base their belief on the signs of increased arterial pressure and cardiac power, the others on the fact that it slows and steadies an irritable, rapidly-acting heart, and they overlook the other signs. *Digitalis is a car-*

diac stimulant, and not a depressant. The quieting of irritability by it is the quietness produced by the drink of whiskey or coffee taken by the speaker before mounting the platform or the pugilist before he enters the ring, to steady his nerves and make him firm. If digitalis is used to decrease arterial tension, its dose must be dangerously large. (See Physiological Action.)

Digitalis is of value in all cases of cardiac disease where the condition is one in which the heart fails to do its proper amount of work. If simple hypertrophy or excessive compensatory hypertrophy exists, it is harmful. It is of less value in aortic regurgation than in any other lesion, because the prolongation of diastole allows greater opportunity for the blood to fall back into the ventricle. In some instances of mitral regurgitation the drug does harm by overdistending the auricle through ventricular stimulation, which results in an increase in the regurgitant flow, and we can never tell before trying it which cases will be so affected. In cases where the heart is *irritable*, *palpitation* present, and indigestion not the cause of the trouble, digitalis is of service. (See Heart Disease.)[1] It is also useful in cardiac dilatation and asthenia—what DaCosta calls a tired heart.

In the *second stage of pneumonia* if the heart is laboring and unable to do its work properly, digitalis is often invaluable (see Pneumonia), and as a heart tonic during the course of *exhausting fevers*, in small doses, is of great service. In *congestion of the lungs* in the typhoid state it will drive out the blood from the part congested and relieve stasis.

In *cardiac weakness* from *collapse*, *injury*, *poisoning*, or *shock* digitalis is of service, particularly in *aconite poisoning*, in which it is the physiological antidote. Owing to the slowness of its action it should, however, be preceded by ammonia and alcohol where the need is pressing. In muscarine poisoning digitalis is the antidote.

As a *diuretic* digitalis is most useful when the *kidneys are congested* and the circulation is sluggish from cardiac feebleness. When the renal structure is diseased other drugs should take its place, or it should be combined with more active renal remedies, such as squill or caffeine, or in very chronic cases of kidney trouble with compound spirit of juniper.

Untoward Effects.—Digitalis sometimes causes nausea and indigestion by irritating the stomach. In children it is very apt to produce marked irregularity of the pulse. When it is given in full doses the patient should always be made to remain in bed and not allowed to sit up suddenly, as syncope may occur. It is particularly important that this rule be enforced if the patient desires to empty his bladder, for cases are on record in which a patient has risen suddenly, emptied the bladder, and fainted or even died in syncope.

In some cases a *cumulative action* occurs which consists in the failure of the drug to appreciably influence the circulation for some days, only to exert all its power suddenly and produce symptoms of poisoning. This is particularly apt to occur where the removal of ascites or dropsy takes place by tapping after the drug has been taken for a long period. It is thought that the sudden withdrawal of pressure upon the great vascular trunks of the body-cavities causes the absorption of the drug with the juices of the tissues where it has remained inactive. Such an accident also sometimes occurs when a fever ends by crisis and digitalis has been given. It also takes place whenever full doses are given so frequently as to be in excess of elimination, for the drug is slowly eliminated, and so rapidly accumulates in the body. Cumulative action is often preceded by a scanty passage of urine. A decrease in the quantity of the urine when digitalis is being used should cause the physician to stop its administration or be most cautious in its continuance.

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[1] It is absolutely necessary for the student to turn to the article on Heart Disease and to read it carefully in order to understand the action of digitalis in disease.

The *contraindications* to the use of digitalis are marked atheroma of the blood-vessels, aneurism, apoplexy, any state of arterial excitement, and true fatty degeneration of the heart.

Administration.—The official preparations of digitalis are the tincture (*Tinctura Digitalis, U. S.* and *B. P.*), dose 10 to 20 drops (0.65–1.3); the infusion (*Infusum Digitalis, U. S.* and *B. P.*), 1 teaspoonful to 4 teaspoonfuls (4.0–16.0); the fluid extract (*Extractum Digitalis Fluidum, U. S.*), dose 1 to 2 drops (0.05–0.1); the extract (*Extractum Digitalis, U. S.*), ¼ of a grain (0.015); and the powdered digitalis-leaves (*Digitalis Folia, B. P.*), dose 1 to 4 grains (0.05–0.2), generally given in a pill. For general purposes the tincture or fluid extract is the best preparation, particularly when we desire to act chiefly upon the heart. When a marked diuretic effect is desired the infusion is often employed. The dose of digitalin, which ought not to be used, is $\frac{1}{60}$ of a grain (0.001).

Digitalis cannot be given in some cases because the stomach is too irritable. Under these circumstances it can be given hypodermically in the form of the tincture, or its absorption can be brought about, particularly well in children, by the use of a poultice made by placing some digitalis-leaves in a small bag and steeping them in hot water. This bag is then placed on the chest. This treatment must be cautiously employed to avoid poisoning.

DIURETIN.

(See Sodio-salicylate of Theobromine.)

DUBOISINE.

Duboisine is the alkaloid of the leaves of *Duboisia myoporoides*, a plant of Australia. The crude drug is little used in medicine, but duboisine sulphate is used as a mydriatic under the same conditions as is atropine, and more largely still as a hypnotic in *insanity*, interchangeably with hyoscine. The dose of duboisine sulphate hypodermically as a hypnotic is $\frac{1}{80}$ to $\frac{1}{60}$ of a grain (0.0008–0.001). The clinical experience so far adduced would seem to indicate that it tends to decrease urinary secretion and to disorder the digestion, producing at the same time a soapy taste in the mouth, with excessive dryness of the mucous membranes. Rarely it causes profuse salivation or sweating in those who have an idiosyncracy to its use. In a large number of insane and hysterical cases De Montyel found its use was followed by vomiting of part of the food, but the patients seemed to have no nausea. The sulphate has been used with much asserted success in the treatment of *paralysis agitans*. Usually the dose by the mouth for this purpose has been $\frac{1}{100}$ of a grain three times a day. Cividati and Gianelli assert that duboisine is useful in *epilepsy*, particularly in its psychic forms.

ELATERIUM.

Elaterium, *B. P.*, is a sediment obtained from the juice of the *Ecballium Elaterium*, or squirting cucumber. It appears in small, easily-broken, thin, grayish-green flakes, and has a bitter taste. Elaterium is not official in the *U. S. P.*, but its active principle, elaterin (*Elaterinum*, *U. S.* and *B. P.*), is official. Notwithstanding this fact, the crude drug is largely used.

Physiological Action.—Elaterium is a very decided irritant to all mucous membranes, and even to the fingers of those who handle it. Its chief effect when taken internally by man is to cause profuse watery stools, but for some unknown reason it rarely acts upon animals in this manner.

Therapeutics.—This drug is the best hydragogue purge which we have, causing very large watery passages, but not producing much pain when used in proper dose. For this reason it is useful in the treatment of *local serous effusions*, as in *pericarditis* and *pleurisy*, and in *dropsy* and *ascites* or general anasarca. It ought never to be used in cases of marked exhaustion, and may be advantageously followed, soon after it acts, by alcoholic stimulants. In *uræmia* with dropsy it is thought to aid in the elimination of the uræmic poison by the bowel. In *cerebral congestions* or *effusions* the drug will often be of service by depleting the diseased vessels.

In poisoning by elaterium the symptoms are those of violent gastro-enteritis, and must be treated accordingly. (See Gastro-enteritis.)

Administration.—The dose of elaterium is $\frac{1}{8}$ of a grain (0.01), given in a freshly-made pill. Elaterin is best given in the dose of from $\frac{1}{30}$ to $\frac{1}{16}$ of a grain (0.002–0.004), as follows:

℞.—Elaterini . . . . gr. iv (0.2).
Alcoholis . . . . f ℥iv (128.0).—M.
Dissolve by gentle heat.
S.—Half a drachm contains $\frac{1}{16}$ grain (0.004), or one full dose.

The official preparation of elaterin, the active principle of elaterium, is *Trituratio Elaterini*, *U. S.* (elaterin 1, sugar of milk 9), given in the dose of ½ to 1 grain (0.03–0.06). The *Pulvis Elaterini Compositus*, *B. P.* (elaterin 1, sugar of milk 39), is given in the dose of 1 to 5 grains (0.05–0.35).

ERGOT.

Ergota, U. S. and *B. P.*, is derived from the spawn or mycelium of the fungus known as *Claviceps purpura*, which grows in the flower and replaces the grain in common rye, or *Secale cereale*.

Many so-called active principles have been isolated by chemists, and named ecbolic acid, ergotic acid, sclerotinic acid, and ergotin. None of them represent the entire drug, the nearest in its approach being ergotin, and ergotin is not an isolated principle, but a combination of principles. Kobert teaches that there are three principles—namely, ergotinic acid, cornutine, and sphacelinic acid—and that cornutine is a true alkaloid. Further, that it is upon this cornutine and sphacelinic acid that the chief activity of the drug depends. Tanret, on the other hand, denies the existence of cornutine as an alkaloid.

Physiological Action.—NERVOUS SYSTEM.—Upon the nervous system ergot exercises little, if any, effect.

CIRCULATION.—Ergot when injected into the circulation causes a primary fall of arterial pressure, followed by a rise. The dominant action is represented in the rise. This rise is due to a stimulation of the vasomotor centres, but the primary fall is caused by its direct depressant effect upon the heart-muscle, resulting from the direct contact of the drug *en masse* with the heart. If the dose be very large, the fall of pressure is never recovered from, and progressive paralysis of the vasomotor apparatus and heart occurs. When given in medicinal doses by the stomach the drug causes a rise of arterial pressure, probably by an action on the vasomotor centre and the muscular coats of the blood-vessels.

UTERUS AND UNSTRIPED MUSCULAR FIBRE.—It has been commonly taught that the contractions of the uterus produced by medicinal doses of ergot arise from the stimulating influence of this drug upon the muscular fibres of this organ; and while this is probably the case, it is also a fact, as shown by the careful studies of Hemmeter, that the drug causes uterine contractions by stimulating the centres in the lumbar portion of the spinal cord which control this viscus.

On the uterus ergot in full medicinal dose exerts its influence—not increasing the normal pains of labor, but causing a tetanic, tonic, unyielding uterine spasm which drives all before it. In very small doses it may assist the normal contractions without causing them to become tetanic.

Ergot acts as a stimulant to all unstriped muscular fibres.

Acute Poisoning.—The symptoms of overdosing from ergot, when the effects are slowly produced, are sometimes great hunger or craving of food, at other times nausea and vomiting. If the poisoning is quite severe, there are great restlessness, headache, delirium, and coldness of the surface of the body.

Chronic Poisoning.—Two forms of poisoning from the prolonged use of ergotized rye bread sometimes occur. One is characterized by spasmodic muscular contractions, the other consists in the formation of gangrenous sloughs. In the first of these forms it is not very uncommon for cataract to develop, and it is stated that the spasms are due to the influence of one of the principles of ergot—namely, cornutine.

Therapeutics.—Ergot is given to parturient women for the prevention or arrest of *post-partum hemorrhages.* For the prevention it should be given to the woman by the mouth just as the head of the child is about to slip over the perineum, and not before. When administered to stop a hemorrhage already flowing, the doses should be large, as much as 1 to 2 drachms (4.0–8.0) of the fluid extract or 2 wineglassfuls (64.0) of the wine of ergot. The drug should produce its effects in about fifteen minutes, and may be repeated every fifteen minutes till it acts. The action lasts about half an hour. Ergot should never be given in the early stages of labor, but this rule may, under certain conditions, be modified. If uterine inertia comes on in the course of a normal labor, and quinine cannot be used for any reason, a *small* dose of ergot may be employed. These small doses do not cause a constant tetanic uterine contraction, but simply bring on the "to-and-fro" movements. By small doses the writer means from 5 to 20 drops (0.35–1.3) of the fluid extract. Caution must be used even with these doses.

If the birth-canal is obstructed, ergot should never be employed, and, unless the os uteri is well dilated, should not be given in any dose.

In post-partum hemorrhage of a severe character it may be well to give a solution of the aqueous extract of ergot hypodermically. The extract should be rubbed with the proper amount of water (parts 1 to 5), and filtered through a fine aseptic handkerchief to get rid of foreign bodies before it is injected.[1]

When ergot is given care should be taken that the uterine cavity is clear of all clots or placental fragments, lest the closure of the os uteri under the influence of the drug imprison these harmful materials.

According to many obstetricians, whose results have been confirmed by a number of special studies, ergot in moderate doses very distinctly aids in overcoming *subinvolution of the uterus.*

In *hemorrhages from the lungs and kidneys* or other unapproachable parts ergot is thought by some to be very useful when given by the mouth, but it is probable that it rarely achieves any real good. Particularly is this the case in pulmonary hemorrhage, since the vasomotor system practically does not exist in the pulmonary vessels, and the increased pressure caused by the ergot in the general systemic circulation may increase the pulmonary leakage. The truth is, that in pulmonary hemorrhage very little real good can be obtained by internal medication.

In *epistaxis*, *menorrhagia*, and *metrorrhagia*, and in some cases of *night-sweats*, ergot is of service. In *hypostatic*, *pulmonary*, and other *congestions* it is useful, particularly if employed with digitalis.

In *dysenteries* with bloody stools and in *serous diarrhœa* ergot sometimes does good.

Some persons suffer from *vertigo* associated with hyperæsthesia of the scalp and *headache*. Relief can often be obtained in such cases by the use of 20 drops (1.3) of the fluid extract of ergot and 5 to 10 grains (0.35–0.65) of bromide of potassium three times a day.

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[1] Under the name of Ergot Aseptic, Parke, Davis & Company now prepare and dispense in sealed and sterile glass bulbs a concentrated preparation of ergot for hypodermic use. Each bulb holds one dose, and the drug is drawn directly from it into the syringe.

Ergot has been used very largely in the treatment of *uterine fibroids* as an expulsive remedy and cure. It is only of value in those cases where the growths are just beneath the mucous membrane. By the contractions of the uterine muscular fibres the blood-supply of the growth is decreased, the recurring hemorrhages cease, and the tumor is finally expelled, having really sloughed out of its bed. This method is far inferior to the knife, and very painful and prolonged. Large growths cannot be so treated. Ergot is sometimes useful in the treatment of *bleeding hemorrhoids*, and it has been given with success in *diabetes insipidus*, when it is well to combine with it the bromide of sodium.

Administration.—Ergot is official in the *U. S. P.* as the fluid extract (*Extractum Ergotæ Fluidum*), dose ½ to 1 drachm (2.0–4.0); the solid extract (*Extractum Ergotæ*), dose 5 to 20 grains (0.35–1.3); and the wine (*Vinum Ergotæ*), dose 2 to 4 drachms (8.0–16.0). Bonjean's ergotin is made by a special process, and it or the solid extract can be given hypodermically in the manner already described. The *B. P.* preparations are *Extractum Ergotæ Liquidum*, dose 10 to 30 minims (0.65–2.0); *Infusum Ergotæ*, 1 to 2 fluidounces (32.0–64.0); *Tinctura Ergotæ*, 10 minims to 1 fluidrachm (0.65–4.0). Ergotin (*Ergotinum*, *B. P.*) is given in the dose of 2 to 5 grains (0.1–0.35). *Injectio Ergotini Hypodermica*, *B. P.* (ergotin 1, camphor-water 2 parts), is given, in the dose of 3 to 10 minims (0.15–0.65), by subcutaneous injection.

ERIGERON, or FLEABANE.

Oil of Erigeron (*Oleum Erigerontis*, *U. S.*) is a yellowish volatile oil of a peculiar, not bad, taste, closely resembling turpentine, which is distilled from the fresh, flowering herb of *Erigeron canadense*. It is by far the best medicinal remedy which we have for the treatment of passive *uterine oozing*, or a "show," as it is sometimes called.

In *epistaxis* and other hemorrhages of moderate degree it is quite useful. In some instances it is used in place of copaiba and cubebs in the later stages of *gonorrhœa*. It is best given in capsule or on sugar in the dose of 10 to 30 drops (0.65–2.0) after meals, or oftener if needed.

ETHER.

Sulphuric ether is official as *Æther*, *U. S.* and *B. P.*, but in the Pharmacopœia of 1880 was called *Æther Fortior*. Pure Ether (*Æther Purus*, *B. P.*) is free from alcohol and water. Ordinary ether is not generally used as an anæsthetic, but for the abstraction of oils and for other pharmaceutical purposes. It is made by the action of sulphuric acid on ethylic alcohol, and is sometimes called, in consequence, ethyl oxide. Ordinary ether contains about 74 per cent. of ethyl oxide and 16 per cent. of alcohol, with a little water. On the other hand, the stronger or official ether contains about 96 per cent. of ethyl oxide and only 4 per cent. of alcohol, with water. Both preparations boil when held in a test-tube if a piece of broken glass is added to the liquid. The stronger ether boils much more vigorously than the weaker under these circumstances.

Ether possesses a peculiar penetrating odor, a hot burning taste, and is a colorless, volatile, and very inflammable liquid. For this reason it should never be held near a fire or light, and, as its vapor is heavier than air, any fire in the room should be above the patient, not below him. No flame should be held nearer to the ether than five feet.

Physiological Action.—The action of ether on the animal organism is very rapid and powerful, but temporary. Except for the rapidity of its effects it is very much like that of alcohol. When applied to the skin, it causes intense cold by its evaporation, and may be used in the form of a spray to benumb or locally freeze a part.

Upon mucous membranes ether as a liquid or in vapor acts as an irritant, and causes, when its vapor is first inhaled, great irritation of the fauces and respiratory tract, so that temporary arrest of respiration is not uncommon. The face becomes suffused and red and the conjunctiva injected. Owing to these conditions the patient often is restless or or struggles to get his face away from the vapor, but a stage of quiet soon succeeds this primary stage of struggling. During this period of quiet the breathing is generally full and deep and the pulse rapid but strong, while the ocular reflexes are at its beginning intact. Following this stage a second period of struggling comes on, in which the patient may become absolutely uncontrollable except by brute force. Yelling, shouting, screaming, cursing, or laughing and crying, may be prominent symptoms, and the individual is pugilistic, caressing, or ill-tempered, according to his temperament. If the drug is now pushed, a condition of total anæsthesia is soon attained, and quietude takes the place of the struggles. This is the time for the operation to be carried on, for if it is attempted in the earlier stages the struggles of the second stage prevent any operative procedures. (See Therapeutics, below.) It is not proper to push the drug till the muscular relaxation amounts to complete flaccidity, as this endangers the respiration.

NERVOUS SYSTEM.—In producing its effects, ether acts first on the brain, then on the sensory tracts of the spinal cord, then on the motor tracts, then on the sensory side of the medulla oblongata, and finally upon the motor side of the medulla, and thereby produces death from respiratory failure if given to excess. Upon the nerve-trunks it exerts no effect unless it is directly applied to them. Ether does not produce anæsthesia by influencing the blood, coagulating the protoplasm of the nervous system, or by any other destructive influence. It simply puts aside, for the time being, the vital functions of the parts affected by it.

CIRCULATION.—Ether is one of the most diffusible and rapidly acting cardiac stimulants which we possess, and is correspondingly fleeting in its effects. It increases the pulse-rate and force by stimulating the heart and the arterial pressure by increasing the activity of the vasomotor centres. In overdoses it acts as a cardiac depressant, but only when the amount is very large. Upon the blood J. Chalmers DaCosta has shown that ether, when given by inhalation, decreases the hæmoglobin and the number of the red corpuscles, particularly in those persons who are already somewhat anæmic.

RESPIRATION.—As already stated, when ether is first inhaled it often causes an arrest of respiration. According to Kretzschmar, this is due to an irritation of the trifacial nerve, which causes a reflex spasm of the glottis, and not to irritation of the peripheral vagi in the lungs. This is only partly true, for the author has proved that section of the vagus nerves prevents this occurrence, so that both the vagal and trigeminal irritations are responsible for the arrest.

Upon the respiratory centre ether acts as a powerful stimulant when used in ordinary amounts; in overdose it paralyzes this part of the nervous system.

TEMPERATURE.—Prolonged etherization lowers the bodily heat very greatly. That of the dog may be lowered some 9° F. in an hour if the drug be pushed, and as great a fall has been known as 4° F. in man. The fall is partly due to the depression of the nervous system and the chilling of the body and lungs by the evaporation of the drug.

ELIMINATION.—Ether escapes from the body by the lungs and kidneys.

Untoward Effects.—Ether, while safer than chloroform, is not absolutely devoid of all dangerous effects.[1] Sometimes, when the drug is pushed too strongly, deep cyanosis with pulsation of the jugular veins shows deficient oxygenation of the blood and cardiac distention. In other, very rare, instances sudden cardiac failure has occurred or total arrest of respiration ensued. In nearly all cases of sudden death from ether grave kidney or heart lesions have been present, and have been found at the autopsy. Rarely the rise of arterial pressure which it produces has caused apoplexy.

In patients under ether the movement of the diaphragm is an exceedingly interesting study, for before the condition known as surgical anæsthesia is developed, while there is still some rigidity and the throat reflex is not completely abolished, the contractions of the diaphragm are frequently so violent that unless the laryngeal opening be absolutely free the intercostal spaces are depressed and the abdominal contents thrust violently downward and outward. Just so soon, however, as the chin is pulled forward and a free access of air is allowed, the abdominal displacement, though it is still present, is not so great, and the chest movement is no longer reversed. As the ether is pushed the respiration becomes purely thoracic, the diaphragm no longer taking part in the respiratory cycle, or becoming so relaxed that it allows the chest on expansion to aspirate the abdominal viscera upward, as is shown by the retraction of the belly-walls at a time when they should normally expand with the thorax in inspiration. This observation would seem to point to the fact that the primary stimulant action of ether upon the respiratory apparatus is particularly felt by those centres which govern the movements of the diaphragm, and that, as this is the case, these centres later on are the first to feel the paralyzing effect of still larger amounts of the drug.

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[1] The mortality due to etherization is about 1 in 20,000 cases.

These facts give us, therefore, a danger-signal during the administration of ether, and the integrity of the diaphragmatic function, as represented by the movement of the belly-walls, should be as carefully observed as are the thoracic excursions, the character of the pulse, or the condition of the pupil. The rule may therefore be laid down that when the diaphragm ceases to act anæsthesia has been carried to its extreme legitimate limit, and that the use of an anæsthetic after this time must be carried on with the greatest care and watchfulness.

The diaphragm is the first part of the respiratory mechanism to yield to respiratory paralysis. In death from any cause the progress of failure of respiration will, in the vast majority of cases, be denoted by a failure on the part of the diaphragm primarily, with compensatory excursions of the chest; and it is also to be noted that as the chest movements fail the accessory muscles of the neck come into play. These muscles in time cease to act, the hyoidean group lose their *point d'appui*, the chest remains motionless, the lower jaw is dropped, and the scene is closed by a few gasps in which the muscles of the neck may be the chief factors.

The treatment of accidents during etherization consists in the withdrawal of the ether, the use of artificial respiration, and the placing of the body, if the face is pale, head downward. On the other hand, if the face is flushed and cyanotic it indicates respiratory, not cardiac, failure, and this position is not to be resorted to. The physician should also employ hypodermic injections of strychnine, atropine, and digitalis, or, more rarely, an intravenous injection of ammonia, which is more dangerous, but better than the others in a pressing emergency because it is more rapid in its action. Ether is often given hypodermically under such circumstances, and seems to do good, but its use is a bad practice, as, if the heart or respiration is already depressed by ether, the employment of still more of the drug simply makes matters worse. The cases in which such a line of treatment is followed by good results are those in which the failure of respiration is not due to a saturation of the body with ether, but to asphyxia produced by mechanical interference with free breathing, as, for example, the presence of mucus in the air-passages or a too close application of the towel to the face. In such cases the hypodermic injection of ether causes so much local pain and irritation as reflexly to call up respiratory movements, as well as to directly stimulate the respiratory centre to greater effort.[1] Alcohol ought not to be used if the other drugs named can be obtained, because alcohol is so nearly allied physiologically and chemically to ether. Frictions, hot applications, and artificial respiration should be practised. (See article on Asphyxia.)

The diaphragm being the most important muscle of respiration, the physician should seek to stimulate it by resorting to Laborde's rhythmic traction of the tongue, which consists in drawing this organ outward and upward from the mouth rhythmically ten to fourteen times a minute.

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[1] As consciousness is not necessary to the carrying out of a reflex action, this is perfectly possible and probable.

As ether is at hand, it may be dashed on the chest and abdomen to cause reflex inspiration, in lieu of cold water, which wets the clothes and does not evaporate rapidly.

In some cases great nausea and vomiting follows the use of ether. This can generally be prevented by the avoidance of food before the operation (see Therapeutics), and by the administration of cracked ice and small doses of aconite or brandy after tbe operation. (See Vomiting.) This condition may also be avoided in many cases by giving oxygen gas with the anæsthetic. (See Oxygen, Important.) Severe bronchitis may occur in invalids and children after the inhalation of ether, and in many cases this is due more to the exposure than the drug. Total or partial anuria may develop after etherization, particularly after abdominal operations; and this is a very dangerous symptom. It has, however, been proved both experimentally and clinically that ether is not capable, in the ordinary patient, of producing renal disorder of any moment unless the kidneys are already diseased. Weir asserts that ether is not dangerous even in those with moderately diseased kidneys. The use of ether in diabetic patients is very dangerous; the patient often never regains consciousness after its use.

Not uncommonly after the use of ether in the case of an old person or a child the bronchial tubes so fill with mucus that there is danger of the patient drowning in his own secretions. Full doses of atropine, which check secretion, given hypodermically, are useful at such times.

Therapeutics.—Ether is used chiefly as an anæsthetic by means of inhalation. The method consists in forming a cone out of a towel and a piece of paper and placing a small sponge in its end. Upon this sponge the ether is poured, and the large open mouth of the cone is placed over the face. If this be done suddenly, the sensation of suffocation is generally so great as to cause fright and struggling, which is inadvisable. The better way is to hold the cone at some distance from the face, and gradually bring it nearer as the effects of the ether are felt. After partial anæsthesia is attained the cone should be placed closely over the face and the vapor be pushed in as concentrated a form as possible, whereas when chloroform is used it should be well mixed with a great amount of air. Care should be taken that the ether does not get into the eyes of the patient, either in vapor or liquid form, owing to the irritation which it will set up. To prevent this a thin piece of muslin wet with water will be found of service if placed over the eyes. A large number of ether-inhalers are employed in preference to the towel, of which the best is probably that known as the "Allis Inhaler."

When ether is to be given no food ought to be allowed the patient for twelve hours preceding its use, except a little milk or tea an hour or two before the operation, in order to avoid vomiting during and after this procedure. The patient should not be allowed to retain any tobacco or false teeth in the mouth, as either may slip into the larynx and cause death while the anæsthetic is being given.

Under the name of the A. C. E. mixture we have employed a compound of alcohol, ether, and chloroform, which is properly but rarely used in America. (See Chloroform.)

Ether may be used as a local anæsthetic in an atomizer spray, owing to the cold produced by its evaporation when it strikes the skin. Thus it is particularly useful in cases where *thoracentesis* or *paracentesis abdominis* is to be performed, and also in cases of superficial *neuralgia*, where the benumbing of the nerve often effects a permanent cure.

Internally, by the stomach, ether is very useful in *colic*, although for *flatulence* of adults and children Hoffmann's anodyne is a more agreeable remedy. In cases of *collapse* ether given by means of the hypodermic needle or by the stomach, is of great service, particularly when cardiac action is very feeble, and it will give relief by inhalation in some of these cases more rapidly than the nitrite of amyl.

In *hiccough* a few inhalations of ether will often stop the spasmodic movements, and other local muscular spasms can be relieved in this way.

Ether may be used to produce muscular relaxation when the surgeon attempts to reduce a *strangulated hernia* by taxis.

In cases where cod-liver oil cannot be digested ether may be given in 20-drop (1.30) doses in ice-water or capsule, either with, or some minutes after, the oil is taken, to aid in its digestion and absorption. The time of its use should be that at which discomfort is apt to come on, and not at any stated moment.

Internal Administration.—When used internally, ether should be given in ice-cold water, or, better still, in capsules, in the dose of 30 drops to ½ an ounce (2.0 : 16.0). If cold water is not used to dilute it, so great is the irritation of the fauces produced by the fumes of the drug that deglutition is impossible.

Contraindications.—Ether should not be used by inhalation in bronchitis or acute nephritis, because of its irritant properties; in peritonitis or gastritis, because it is apt to induce vomiting; in aneurism or in the presence of marked vascular atheroma, because it may rupture a blood-vessel by raising arterial pressure; nor in diabetes.

ETHYL BROMIDE.

Bromide of Ethyl is obtained by distilling a mixture of alcohol, sulphuric acid, and bromide of potassium, and is a colorless fluid of neutral reaction, having a pleasant odor resembling chloroform. It evaporates with great rapidity, and any sample which does not do this is to be discarded. Poured on the hand, it should leave no fatty feeling. It should be remembered that the drug is decomposed by sunlight and when in contact with pure air. In the presence of lamplight the fumes form bromal hydrate and bromine. The drug should be kept in dark-glass bottles. The physician should distinctly separate in his mind bromide of ethyl from bromide of ethylene. The latter is a chemical product possessing very dangerous properties, and should never be used in medicine. There is reason to believe that unfavorable symptoms follow the use of bromide of ethyl only when the drug is impure or is improperly used.

Physiological Action.—According to the studies of Thornton and Meixell in the Laboratory of the Jefferson Medical College, the dominant action of the bromide of ethyl is on the respiratory, not on the circulatory, system. This effect is depressant, but only seen after excessive doses. The blood-pressure falls under its influence to a slight degree, and the pulse is slowed through an influence probably exercised on the inhibitory nervous mechanism of the heart.

Therapeutics.—Bromide of ethyl is a useful anæsthetic for short operations, such as opening boils or abscesses, or for the relief of the pain in other brief surgical procedures. Originally introduced into general use in this country by Levis, it has been found unsuited to major surgical cases, because if continued for a long time it seriously depresses the respiration. Bromide of ethyl has been found of the greatest value by Montgomery of Philadelphia as an anæsthetic in labor and for minor gynecological operations in office practice. He finds that the patient may be allowed to inhale the drug from a Hawley inhaler, for as soon as she has had enough to produce anæsthesia the inhaler drops from her hand. The patient is also more obedient to the physician's directions, because of the fleeting influence of the drug, than when chloroform or ether is taken, and it is not so apt to cause post-partum hemorrhage through uterine relaxation.

A very great advantage possessed by bromide of ethyl is the rapidity of its action. A few whiffs are generally all that is needed to cause anæsthesia. It rarely produces disagreeable effects. Cases of sudden death under its use are, however, on record, and in some instances nervous twitchings, and even tetanic spasms, have been known to follow its employment. These tetanic symptoms are, however, fleeting and generally of little importance. Nausea and vomiting rarely follow its employment, but it is apt to leave an unpleasant garlic-like taste in the mouth, and a similar odor of the breath is frequently noted for several days after its use.

Administration.—Bromide of ethyl should be administered for but a brief period, but when taken should be inhaled freely. It cannot be given carelessly with good effect. If a good sample is employed, 45 minims to 3 drachms (3.0–12.0) is a sufficient amount to induce anæsthesia. This quantity should be used at once, instead of added to the inhaler drop by drop, as in the case of chloroform, and the cloth or inhaler should be held close to the mouth and nose, instead of at a little distance, as is often necessary with other anæsthetics.

ETHYL IODIDE.

This is a colorless, non-inflammable liquid, which really should be called hydriodic ethyl. Ethyl iodide must be kept in dark-colored bottles in a dark place to prevent it from undergoing decomposition. It is very volatile, and the fumes arising from it are slightly pungent, but not irritating in ordinary amounts. Unfortunately, the odor is disagreeable to most persons.

Physiological Action.—Very little is known of the general physiological action of iodide of ethyl, and the drug would be a good one for laboratory investigation. It does not produce anæsthesia except in very large amounts.

Therapeutics.—Iodide of ethyl is used in medicine entirely by inhalation for the treatment of *subacute* or *chronic catarrh* of the *air-passages* and for the purpose of rapidly impressing the system with iodine for alterative purposes, for it is the iodine in the remedy which produces the curative effects desired. In catarrhal states of the bronchial tubes the stimulating effect of the iodine is supposed to cause free secretion and to prevent abnormal thickening of the mucus and dilatation of the air-passages. For this reason iodide of ethyl is supposed to be of service in *asthma* and its resulting *emphysema*. Very recently Bartholow has recommended this drug in the treatment of pneumonia. It is said by that writer to be particularly useful in the later stages of this disease, to aid in producing resolution, but the author has never seen it produce much effect.

Administration.—10 to 20 drops (0.65–1.3) may be placed upon a handkerchief and inhaled, or a small vial filled with the drug may be held in the hand under the nostrils. Under these circumstances the heat of the hand sets free the necessary amount of vapor.

EUCAINE HYDROCHLORATE.

Eucaine hydrochlorate is a synthetic substance having a chemical formula closely resembling cocaine, and for this reason it was thought probable by Leibreich and Vinci, working in the Pharmacological Institute in Berlin, that it might have a similar anæsthetic effect. This has been found to be the case, and the drug is now marketed as a substitute for cocaine, it being claimed that it does not affect the heart as does the latter drug. Eucaine, however, does not cause a primary contraction of the blood-vessels when locally applied, as does cocaine, but a hyperæmia of the parts affected. Used by the process for producing infiltration anæsthesia (see Cocaine), it produces considerable pain before acting as an anæsthetic. In ophthalmic practice it is employed in 2 per cent. solution, and to ordinary mucous membranes in 10 per cent. solution—that is, from 10 to 48 grains to the ounce of water. One advantage of eucaine is that it forms a permanent solution with water in 10 per cent. solution. Further, eucaine solutions can be boiled before they are used without causing decomposition of the drug.

Eucaine hydrochlorate possesses a distinct disadvantage in its inability to cause primary contraction of the blood-vessels when locally applied, and this effect of cocaine is often most valuable to overcome local engorgement. Eucaine is also capable of producing internal effects resembling those due to overdoses of cocaine, and these must be treated by the use of strong coffee, alcohol, digitalis, and strychnine. If the case is pressing ether, ammonia, and nitroglycerin may be used as rapidly-acting stimulants.

Eucaine hydrochlorate is an expensive drug at present.

EUCALYPTUS.

Eucalyptus, U. S., is the leaves of the *Eucalyptus globulus*, or blue-gum tree, a native of Australia, but grown at present all over the world. Its chief medicinal constituent is the oil of eucalyptus (*Oleum Eucalypti, U. S.*), from which is derived *Eucalyptol, U. S.*, which is a camphorous body obtained by redistillation with caustic potash or chloride of calcium. The oil of eucalyptus and eucalyptol are used for the same purposes, but the latter is the refined product of the former.

Physiological Action.—Locally applied, the oil is a decided irritant. 10 to 20 drops (0.65–1.3) taken internally cause slight stimulation, followed by a sense of calm, while larger doses produce disturbed digestion and loose, oily-odored stools. The pulse is increased in frequency and force, and intense headache may come on. After very large doses there is a fall in pulse-force, bodily temperature, and strength of limb, and the respirations are decreased. A peculiar loss of sensation in the lower limbs may occur. If death takes place, it is due to respiratory failure. The drug is eliminated by the skin, kidneys, bowels, and lungs. The urine may have the odor of violets, as it sometimes does after the use of oil of turpentine.

The oil of eucalyptus has considerable antiseptic power.

Therapeutics.—Eucalyptus is used in *malarial fever* where quinine cannot be had, nor be borne by the patient owing to idiosyncrasy. In *bronchitis*, in an emulsion or in capsule, it is of great value in the later stages (see Bronchitis), since in its elimination by the lungs it acts locally upon the inflamed mucous membrane, and it may be used in the subacute forms of *gonorrhœa* in the same manner. The following prescription will answer:

℞.—Olei eucalypti . . . . f℥j (4.0).
Olei amygdalæ dulc. . . . . f℥j (4.0).—M.
Ft. in capsule No. x.
S.—One t. d. after meals.

Oil of eucalyptus is very useful in some forms of *rheumatic headache* or in headache dependent upon malarial fever.

Eucalyptol, U. S., is obtained from oil of eucalytus, and is largely employed by rhinologists and others in lotions and other nasal applications It may be used in solutions of fatty oils, but is insoluble in water, although it is soluble in alcohol and ether.

Administration.—The fluid extract (*Extractum Eucalypti Fluidum, U. S.*) is given in the dose of 10 drops to 2 drachms (8.0), the oil (*Oleum Eucalypti, U. S.* and *B. P.*) in the dose of 5 drops (0.35). The dose of eucalyptol is 5 grains (0.35) in capsule.

Unguentum Eucalypti is official in the *B. P.*, but is seldom used.

EUONYMUS.

Euonymus, U. S., or Wahoo, is the bark of *Euonymus Atropurpureus*, a native plant of the United States. It contains an active principle, *Euonymin, B. P.* As a laxative its action is very slow and moderate, but it is thought to act particularly on the liver, and may be used when mild *hepatic torpor* is present.

Administration.—The dose of the solid extract (*Extractum Euonymi, U. S., Extractum Euonymi Siccum*) is 3 to 10 grains (0.15–0.65). Of euonymin the dose is ½ to 1 grain (0.03–0.05).

EUPATORIUM.

Eupatorium, U. S., Thoroughwort or Boneset, is the leaves of the *Eupatorium perfoliatum*, an American plant which is very largely used as a simple bitter tonic and diaphoretic in household medicine. The drug is generally given in hot infusion in cases of *arrested menstruation* due to cold or in the chill of a *remittent* or *intermittent fever*, and also for *anorexia* and *debility*. Its taste is very disagreeable, and in the dose of a pint (500 cc.) of the cold infusion it has been used as an emetic. The fluid extract (*Extractum Eupatorii Fluidum, U. S.*) is given in the dose of 30 drops to 1 drachm (2.0–4.0).

EUPHORBIA PILULIFERA.

This herb is sometimes called Snake-weed or Cat's-hair, and is a native of Australia and the West Indies, where, like stramonium, it grows profusely as a weed by the wayside.

Physiological Action.—In toxic doses the drug kills small animals by failure of the respiration and circulation, these two vital functions being greatly affected by doses which exert no great influence on the rest of the body. In full dose it may cause some gastric irritation.

Therapeutics.—Euphorbia pilulifera is one of the latest remedies introduced into medicine for the relief and cure of *asthma*, in which disease the results obtained, after other remedies fail, are very extraordinary if the reports of those who have given it a thorough trial can be accepted without reserve. As yet we do not know the form of asthma which is most relieved by its use, and its employment is purely empirical. It has also been highly praised in the treatment of chronic bronchitis and emphysema.

Administration.—Euphorbia pilulifera is best given in the form of the fluid extract in the dose of 30 drops to 1 drachm (2.0–4.0). The decoction is made by adding a "handful of stalks with the leaves on them to 2 quarts (2 litres) of boiling water, and boiling down to 1½ quarts (1½ litres)." Of this decoction the dose is a small wineglassful (64.0) three times a day. (See Asthma.)

EUROPHEN.

Europhen is the result of the action of iodine on isobutylorthocresol in the presence of an alkali, and appears as a fine yellow powder, soluble in alcohol, ether, chloroform, and oils, but insoluble in water. Introduced because it was hoped that it might prove a useful substitute for iodoform, its usefulness is still undecided, owing to the short time that it has been before the profession. One advantage claimed for it is that it parts with its iodine very slowly, and so is not apt to produce toxic symptoms as rapidly as does iodoform. For this very reason, however, it lacks the remedial power of the older drug, except in those instances in which a drying powder is needed which will keep the wound pure by making it too dry to be favorable to the growth of germs. When such an action is desired, europhen possesses the additional advantage of being five times as bulky as iodoform. In the treatment of tuberculous growths europhen has already proved itself very inferior to iodoform. Owing to its stability, it fails to part with its iodine except in the presence of moisture, and is useless in dry skin diseases. It has been found useful in *scrofuloderm*, *ulcer of the legs*, and *lupus*. Europhen may be employed externally in a salve of the strength of from 5 to 10 per cent., or with olive oil or lanolin. It can also be added to flexile collodion. The drug does not possess the odor of iodoform, but experience will probably prove it to be more irritating than the latter drug. The internal dose is 1 to 3 grains (0.05–0.15) in cases of syphilis. Europhen is incompatible with metallic oxides and the preparations of mercury, and also with the starch and zinc paste largely used by dermatologists.

EXALGINE.

This substance is really methyl-acetanilid, and closely resembles acetanilid or antifebrin in its effects. It is given for the same purposes as is acetanilid and antipyrine—namely, for the relief of pain in *locomotor ataxia* and other nervous affections—but never as an antipyretic. When used, exalgine should be given night and morning as a rule, so that the doses shall not be near together. The beginning dose should be from 2 to 4 grains (0.1–0.2), and not more than 15 grains (1.0) should be given in twenty-four hours. It is stated by those who have used the drug that fever contraindicates its employment.

The following prescriptions will be found applicable:

℞.—Exalgini	gr. xxx (2.0).
Tincturæ aurant. dulcis	fʒij (8.0).—M.
Ft. in sol. et adde	
Syr. aurantii	f℥ss (16.0).
Aquæ menth. piperit.	q. s. ad f℥iv (128.0).—M.

S.—A tablespoonful night and morning.

Or,

℞.—Exalgini	gr. xxx (2.0).
Spt. frumenti	f℥ss (16.0).—M.
Ft. in sol. et adde	
Syr. simplicis	f℥j (32.0).
Aquæ dest.	q. s. ad f℥iv (128.0).—M.

S.—Tablespoonful night and morning.

FLAXSEED.

Flaxseed or Linseed (*Linum, U. S.*) is the seed of *Linum usitatissimum*, or flax from which linen is made; it is official in the *B. P.* as *Lini Semina*. These seeds contain an oil and a mucilage, the first of which is largely used in the arts, and the second is sometimes employed in medicine. The oil (*Oleum Lini, U. S.* and *B. P.*) is also used by physicians and pharmacists for various purposes.

Therapeutics.—Flaxseed acts as a demulcent to *inflamed mucous membranes*, and is used largely in the treatment of *acute cystitis, bronchitis, gastritis, nephritis*, and similar states, in the form of flaxseed tea. This is prepared by mixing together 3 drachms (12.0) of flaxseed, not ground, 30 grains (2.0) of extract of liquorice, 10 ounces (320.0) of boiling water, and allowing the mixture to stand one to four hours in a warm place. If the mixture is boiled, the oil is set free and makes the dose disagreeable. This infusion may now be made more tasteful and useful by the addition of a little lemon-juice and sugar and by the placing of from 1 to 2 drachms (4.0–8.0) of gum arabic in the pitcher containing it. If the cough is excessive, a little paregoric may be added. Linseed oil is used sometimes as a laxative in the dose of 2 ounces (64.0), and is said to be of service when so given in the treatment of *hemorrhoids*.

Flaxseed meal (*Lini Farina, B. P.*) is employed universally when moistened as a useful poultice.

Under the name of Carron oil an emulsion of lime-water and linseed oil, equal parts, is the standard application for limited or extensive burns.

An infusion of linseed (*Infusum Lini*) and a poultice (*Cataplasma Lini*) are official in the *B. P.*

FORMIC ALDEHYDE (FORMALDEHYDE).

Formic aldehyde is a gaseous body difficult of application because of its physical characteristics, but nevertheless possessing very great power as a disinfectant or germicide. It is prepared by subjecting methyl alcohol to oxidation, and almost every instrument-maker has a device whereby this gas may be generated, and the room formerly occupied by a sick person thereby disinfected far more efficaciously than can be accomplished by burning sulphur. The doors and windows of the room should be tightly shut during the process of disinfection and for several hours after the formaldehyde generator is exhausted. As the gas is exceedingly irritating to the eyes and respiratory passages, no one should attempt to enter the room. After the disinfection is completed the room should be aired for some hours, or, if it must be used at once, it may be rendered capable of habitation by spraying a 20 per cent. solution of ammonia to neutralize the acid atmosphere. The great advantage of formaldehyde for these purposes is the fact that it permeates every nook and cranny, and yet does no injury to colored fabrics, as does chlorine gas under similar circumstances. Such generators as have been named can be had for about four dollars.

A solution of formic aldehyde in the strength of 40 per cent. has been widely used of late for disinfectant and antiseptic purposes. For all these purposes it is usually diluted still further by the addition of water. A 1 per cent. solution is usually quite active enough for surgical antisepsis, and is far less poisonous than is the bichloride of mercury. A similar percentage, or a little stronger, may be used to preserve pathological specimens, and it is stated that in the proportion of 1 to 32,000 it will preserve milk for several days. Taken internally in small amounts, it does not possess any toxic properties.

Concentrated undiluted formaldehyde solution may be used for the purpose of cauterizing syphilitic sores.

The safety, efficiency, and cheapness of formaldehyde gas as a disinfectant, and of the solution, render this agent a most valuable one.

GALLIC ACID.

Acidum Gallicum (*U. S.* and *B. P.*) is usually prepared from tannic acid. It occurs in nearly colorless, long, needle-like crystals, which are soluble in 100 parts of cold water, 4½ parts of alcohol, and 3 parts of boiling water.

Physiological Action.—Gallic acid is an astringent, but not a coagulator of blood. Locally applied in bleeding, it is useless, but given internally in hemorrhages which cannot be acted upon by the direct locally application of tannic acid, it is useful as a hæmostatic because it contracts the blood-vessels. It is eliminated from the body by the kidneys as gallic acid.

Therapeutics.—Gallic acid may be used with some success in *hæmaturia*, *hæmoptysis*, *colliquative sweats*, and in *chronic bronchitis* with profuse expectoration.

Combined with opium, it is one of the best remedies in *diabetes insipidus*, and is even useful in *diabetes mellitus*.

In *albuminuria* dependent upon a relaxed, atonic state of the kidneys and in *acute or chronic diarrhœa* gallic acid may be used with advantage. In the form of the ointment it is useful in the treatment of *psoriasis*, and in the cure of *ulcers* and *sores* which are actively discharging. A very useful application to *external hemorrhoids* is equal parts of stramonium ointment and gallic acid.

Administration.—Gallic acid is given in the dose of 2 to 40 grains (0.1–2.6) in pill or solution. It ought never to be used with any salt of iron, as it is chemically incompatible. The preparations used locally are *Unguentum Acidi Gallici* and *Glycerinum Acidi Gallici*, *B. P.*, given in the dose of 10 to 60 minims (0.65–4.0).

Nut-gall.

Nut-galls (*Galla*, *U. S.* and *B. P.*) are the small excrescences found upon the oak (*Quercus lusitanica*) formed by the ova of the fly *Cynips Gallæ tinctoriæ*. Their sole value depends upon the tannic acid contained in them, and they are official in the form of the tincture (*Tinctura Gallæ*, *U. S.* and *B. P.*), dose ½ to 2 fluidrachms (2.0–8.0), and the ointment (*Unguentum Gallæ, U. S.* and *B. P.*). *Unguentum Gallæ cum Opio* is official in the *B. P.*, and is used as an astringent and sedative ointment.

GAULTHERIA.

Wintergreen, or *Gaultheria procumbens*, is an American evergreen containing a volatile oil. The oil possesses a peculiar, exceedingly penetrating odor and a warm aromatic taste. It is about 96 per cent. salicylate of methyl. *Salicylate of Methyl* (*Methyl Salicylatis, U. S.*) is an artificial product made official in the last revision of the U. S. P.

Physiological Action.—Owing to the large amount of salicylate of methyl contained in the oil, its physiological action is almost identical with that of salicylic acid.

Therapeutics.—Aside from its use as a flavoring substance, oil of gaultheria is largely used in place of the ordinary salicylates in all forms of *rheumatism*. The oil (*Oleum Gaultheriæ, U. S.*) is best given in capsules or emulsion or dropped on a teaspoonful of sugar three times a day after meals. The dose may be as high as 100 drops (7.0) a day, but if 60 drops (4.0) three times a day do no good, pushing it further is practically useless. Very few patients can take more than 30 drops a day.

Very recently Lannois and Limousin of Lyons has highly recommended the application of this oil to acute and chronic rheumatic joints. The oil is placed on lint, and then the lint is wrapped around the part affected, evaporation being prevented by applying a gutta-percha covering. They assert that this treatment gives rapid relief, although they admit that after it the skin may desquamate.

The spirit of gaultheria (*Spiritus Gaultheriæ, U. S.*) is given in the dose of 10 to 20 minims (0.65–1.3).

GELSEMIUM.

Gelsemium, U. S. and *B. P.*, or Yellow Jasmine, as used in medicine is the rhizome of the *Gelsemium sempervirens*, a climbing plant of the Southern United States. It contains an alkaloid, gelsemine, and gelseminic acid.

Physiological Action.—NERVOUS SYSTEM.—Gelsemium paralyzes the spinal cord, particularly on its sensory side (?), although the motor side is certainly ultimately depressed. It does not influence the nerves or muscles except those of the head, on which it acts as a paralyzant, particularly affecting the motor fibres,

CIRCULATION.—Gelsemium is a depressant to the circulation, acting particularly on the heart. It paralyzes the vagus and lowers blood pressure.

RESPIRATION.—Gelsemium kills by paralyzing the respiratory centres (Sanderson, Ringer, and Murrell).

TEMPERATURE.—In overdose the drug lowers bodily heat very markedly.

EYE.—Gelsemium is a mydriatic of considerable power, causing, when dropped into the eye, wide dilatation of the pupil, a result due to paralysis of the oculo-motor nerve peripherally.

Therapeutics.—Gelsemium is used in *headache* and *migraine* depending on nervous troubles or upon *eye-strain*. It is particularly useful in combination with cannabis indica. (See Cannabis Indica and Migraine.)

In *malarial fever* it is said to be of great service, but this is doubtful. In the early stages of *pneumonia* and *pleurisy* it has been highly spoken of by Bartholow.

Gelsemium has also been found of value in *asthma*, *whooping cough*, *laryngismus stridulus*, and *nervous cough*. In localized *muscular spasm*, such as seen in *torticollis* or *wry-neck*, and in *spasmodic dysmenorrhœa*, it is of considerable service. It ought not to be used if the system is already depressed, but only in sthenic cases.

When used as a *mydriatic*, Tweedy recommends gelsemine as equal to atropine in effect, but much more transient in its influence. He uses a solution of 8 grains of gelsemine to the ounce (0.5 : 32.0) of water, instilled, drop by drop, into the eye every fifteen minutes for one hour, and then every half-hour for two hours.

Poisoning.—The most prominent symptoms of gelsemium poisoning are ptosis and dropping of the jaw. These are preceded by a sensation of languor, a desire to lie down, relaxation, and muscular weakness. Gelsemium is apt to cause temporary internal squint, owing to its paralyzant action on the sixth pair of cranial nerves. The pulse becomes rapid and feeble, the skin wet and cold, the face pinched and anxious, the voice is lost in aphonia, and death ensues from centric respiratory failure and an almost simultaneous cardiac arrest. Sensation in man is impaired very late in the poisoning.

The treatment of the poisoning consists in the use of cardiac stimulants, such as ammonia and digitalis, the application of external heat, and the employment of atropine and strychnine for the purpose of stimulating the respiratory centre. Emetics and the stomach-pump are, of course, to be employed.

Administration.—The fluid extract (*Extractum Gelsemii Fluidum, U. S.*) is given in the dose of 5 to 10 minims (0.35–0.65), and the tincture (*Tinctura Gelsemii, U. S.* and *B. P.*) 10 to 20 drops (0.65–1.3). In some parts of the United States physicians largely employ a very strong unofficial tincture of gelsemium, the dose of which is 1 to 2 drops. Gelsemine may be used in the dose of $\frac{1}{60}$ of a grain (0.001). *Extractum Gelsemii Alcoholicum, B. P.*, is given in the dose of $\frac{1}{4}$ to $\frac{1}{2}$ grain (0.008–0.015).

GENTIAN.

Gentiana, U. S., is the root of the *Gentiana lutea*, or Yellow Gentian, a European plant. It contains gentianine and gentisic acid, and has a bitter taste. This drug is official in the *B. P.* as *Gentianæ Radix*.

Therapeutics.—Gentian is one of the most efficacious bitter tonics that we possess. In the *anorexia* following acute diseases and in *gout* and *malarial poisoning* with *dyspepsia* it is of service. Combined with bicarbonate of sodium, it is of great service in the treatment of the subacute *gastric and intestinal catarrh* of children.

Administration.—The compound tincture (*Tinctura Gentianæ Composita, U. S.* and *B. P.*) is given in the dose of 1 drachm to a wineglassful (4.0–64.0), the fluid extract (*Extractum Gentianæ Fluidum, U. S.*) in the dose of 30 drops to 1 drachm (2.0–4.0), and the solid extract (*Extractum Gentianæ, U. S.* and *B. P.*) in the dose of 1 to 8 grains (0.05–0.40). *Infusum Gentianæ Compositum, B. P.*, is given in the dose of 1 to 2 fluidounces (32.0–64.0). The compound tincture and compound infusion are composed of gentian, bitter orange-peel, and cardamoms. The following prescription is an excellent one for use in convalescence from prolonged fevers:

℞.—Acid. nitro-hydrochlor. dil. . . . . f ʒj vel f ʒij (4.0–8.0).
Tr. nucis vomicæ . . . . f ʒj (4.0).
Tr. cardamomi comp. . . . . f ℥ij (64.0).
Tr. gentianæ comp. . . . . . q. s. ad f ℥iv (128.0).—M.
S.—Teaspoonful (4.0) in water after meals.

GERANIUM.

Geranium, U. S., is the rhizome of *Geranium maculatum*. It contains tannic and gallic acids, and is useful as an astringent in cases of *serous diarrhœa*. It is not the common red geranium seen in flower-gardens.

In *infantile diarrhœa* geranium-root, boiled in milk in the proportion of one or two roots to the pint, will be found of great service and is tasteless. The dose of the drug itself is 20 to 60 grains (1.3–4.0), and that of the fluid extract (*Extractum Geranii Fluidum, U. S.*) ½ to 1 fluidrachm (2.0–4.0).

GINGER.

Zingiber, U. S. and *B. P.*, is the rhizome of *Zingiber officinale*, a plant of Hindostan, Jamaica, and other tropical countries. Black ginger is the dried rhizome with its bark, while white ginger has this covering removed. It contains a hot volatile oil and an aromatic resin, and is very largely used in domestic medicine as a carminative and stomachic. In the treatment of *menstrual cramps* it is often given, and is particularly useful in those cramps due to suppression from exposure to cold. Ginger is often combined with purgative medicines to stop griping and for its pleasant flavor. Of itself it is decidedly constipating, and when used in *diarrhœa* mixtures is of value other than as a flavoring addition to the prescription.

Administration.—The fluid extract (*Extractum Zingiberis Fluidum, U. S.*) is given in the dose of 10 to 30 drops (0.65–2.0), well diluted; the tincture (*Tinctura Zingiberis, U. S.* and *B. P.*), dose 20 drops to 2 drachms (1.3–8.0); the syrup (*Syrupus Zingiberis, U. S.* and

B. P.), dose 30 drops to 2 drachms (2.0–8.0); the oleoresin (*Oleoresina Zingiberis, U. S.*), dose ½ to 1 drop (0.03–0.05), well diluted or in pill; and the troches (*Trochisci Zingiberis, U. S.*) used as stimulants to salivary secretion. In the *B. P.* a stronger tincture, *Tinctura Zingiberis Fortior*, is official, dose 5 to 20 minims (0.35–1.30).

GLYCERIN.

Glycerinum, U. S. and *B. P.*, is a liquid obtained by the decomposition and distillation of fats. It possesses great power in absorbing water and of dissolving many substances. Even if pure it irritates the skin of susceptible persons when applied locally by its absorption of water, and often causes a slight rash.

Physiological Action.—Injected into the circulation in large amounts, glycerin causes convulsions, which are due to its hygroscopic power.

According to the clinical researches of Pavy, glycerin increases the polyuria of diabetes almost one-half, and for this reason he thinks it is not to be employed in this class of cases as a substitute for sugar. Other clinicians, however, disagree with him and use it constantly for this purpose with asserted advantage.

Therapeutics.—Glycerin may be employed as a sweetening agent in the food of *diabetics* and in cases where sugar cannot be used. It has also been given as a laxative in 1- or 2-drachm (4.0–8.0) doses by the mouth, and in enema—1 to 4 drachms (4.0–16.0) with or without equal parts of water. In some cases it may be used in suppository in the official *Suppositoria Glycerina, U. S.* This latter method is very successful in *chronic constipation*. Its continued use by suppository may, however, result in rectal irritation.

As an antiseptic it is used for preserving specimens and for keeping alkaloids in solution for hypodermic use.

In *acute coryza*, applied by a spray or brush to the nostrils, it is sometimes of service; for this purpose it should be diluted four or five times with water. If used on the skin, it should be diluted one-half with water. In cases of *impacted cerumen* in the external auditory canal glycerin is often of service in softening the mass.

The uses of glycerin, other than those mentioned, are many. In the proportion of equal parts of glycerin and water it makes a very useful mouth-wash for the *sore* and *dry mouth of typhoid fever* and for the removal of *sordes*. The same wash, with lemon-juice added to it, is very agreeable and will relieve the dry, glazed tongue of advanced *phthisis*.

Owing to the fact that glycerin is hygroscopic, it may be used as a depletant on a pledget of cotton in congestion of the uterine cervix, the tampon being renewed daily. (See Boric Acid and Boroglyceride.)

For the prevention of *bed-sores* Ringer recommends the daily washing and rubbing of the part likely to be affected, followed by the application of glycerin, and a draw-sheet placed smoothly against the patient to protect the bedding.

Glycerin and whiskey is a favorite household remedy for *colds* and *coughs*, but is not very useful. Glycerite of starch (*Glyceritum Amyli, U. S.* and *B. P.*) is used as a protective over superficial irritations of the skin. Glycerite of yolk of egg (*Glyceritum Vitelli, U. S.*) is used in making emulsions.

A very useful ointment for the application of medicinal substances to the skin may be made by mixing constantly in the presence of heat 1 part of potato starch and 15 parts of pure glycerin. The result is a clear, transparent, jelly-like substance which does not decompose, and has the advantage of holding the medicament which it carries in solution rather than by mechanical suspension.

The *B. P.* preparations of glycerin are as follows: *Glycerinum Acidi Carbolici*, *Glycerinum Acidi Gallici*, *Glycerinum Acidi Tannici*, *Glycerinum Aluminis*, *Glycerinum Boracis*, *Glycerinum Plumbi Subacetatis*, and *Glycerinum Tragacanthæ*.

GOLD.

Gold itself is not official in the *U. S. Pharmacopœia*, but has been recommended very highly by Bartholow in *chronic Bright's disease* in the form of the chloride of gold and sodium (*Auri et Sodii Chloridum, U. S.*). The dose of this substance is $\frac{1}{20}$ to $\frac{1}{10}$ of a grain (0.003–0.006) once, twice, or thrice a day. The author has not found it of much value. Gold has also been strongly recommended for indigestion with epigastric pain after eating when looseness of the bowels is present, and it is said to act as a powerful sexual stimulant and to be of service in *impotence* dependent upon inability to obtain an erection or when there is deficient glandular action. In overdoses the drug causes gastro-enteritis. Magruder has recommended chloride of gold and sodium in the treatment of *pertussis*.

GRINDELIA ROBUSTA.

Grindelia, U. S., is an American plant (*Grindelia robusta*) containing a resin, a volatile oil, and an alkaloid.

Physiological Action.—Upon the lower animals and man this drug is not very powerful in its action, but may cause, in large doses, paralysis of the peripheral sensory nerves, the sensory centres in the spinal cord, and finally the motor centres and nerve-trunks. It slows the heart by stimulating the vagi, and raises blood-pressure by stimulating the vasomotor centre.

Therapeutics.—Grindelia robusta is an exceedingly useful remedy in some cases of *asthma* and in *bronchitis* in its later stages. It may be given in the dose of 20 to 60 drops (1.3–4.0) of the fluid extract (*Extractum Grindeliæ Fluidum, U. S.*), or by inhaling the fumes of burning grindelia-leaves, which are previously soaked in a solution of nitre, dried, and burned on a plate or rolled into a cigarette and smoked. In *chronic cystitis* it stimulates the bladder and is of great service. By diluting it 1 to 10 with water it forms one of the best lotions that we have for the relief of the dermatitis produced by poison ivy or *Rhus Toxicodendron*.

Administration.—The only preparation which is official is the fluid extract (*Extractum Grindeliæ Fluidum, U. S.*), dose 20 to 60 drops (1.3–4.0).

GUAIAC.

Lignum Vitæ, or *Guaiacum officinale*, a West Indian tree, is used in medicine in two forms—namely, as guaiac wood (*Guaiaci Lignum, U. S.* and *B. P.*), which is in raspings and enters into the compound syrup of sarsaparilla, and guaiac resin (*Guaiaci Resina, U. S.* and *B. P.*), or guaiac, which is soluble in alcohol, ether, and chloroform, but is insoluble in water.

Therapeutics.—Guaiac has been largely used in *syphilis*, but is now rarely, if ever, so employed. Given in *acute tonsillitis* in the dose of 30 grains in an emulsion made by the use of white of egg, it will often abort the disease. In *rheumatism* it has been largely used. The ammoniated tincture of guaiac is sometimes employed in the treatment of *sore throat*, particularly if it be rheumatic in type, but is a disagreeable preparation to take into the mouth, and the salicylates may always be used in its place.

Administration.—The tincture (*Tinctura Guaiaci, U. S.*) is given in the dose of 5 to 60 drops (0.35–4.0), and the ammoniated tincture (*Tinctura Guaiaci Ammoniata, U. S.* and *B. P.*) is used in the same dose, preferably in milk. *Mistura Guaiaci, B. P.*, is given in the dose of 1 to 2 fluidounces (32.0–64.0).

GUAIACOL.

Guaiacol is a liquid constituting from 60 to 90 per cent. of creosote. It is obtained by the distillation of beechwood creosote, followed by a complicated process which it is not necessary to describe. In other cases guaiacol is obtained from beechwood creosote by precipitation with barium hydrate. Much of the "absolute guaiacol" of commerce is impure. Chemically pure guaiacol, obtained by the process last named, is a light-colored fluid of an agreeable odor and soluble in water in the proportion of 1 to 85 (Helbing). It is easily soluble in alcohol and ether.

Therapeutics.—Guaiacol has been largely used by some practitioners, chiefly in Europe, for the treatment of *tuberculosis* as a substitute [illegible] creosote, because it is the principal ingredient of that drug. (See Creosote.) It was thought by Guttmann, Sommerbrodt, and others that the good effect of creosote was due to its destructive action on the bacillus, or that it so improved digestion as to increase the resistance of the patient to the spread of the disease. Recently, Hoelscher [illegible] have asserted that guaiacol and creosote produce their [illegible] by forming compounds with the toxines or poisonous [illegible] formed by the bacilli, which are then eliminated from [illegible] The same rules govern the use of guaiacol as govern the [illegible] creosote. It is best given with brandy, wine, or other alcoholic drink, or in capsules with cod-liver or sweet oil. 5 or 10 drops (0.35–0.65) of guaiacol may be added to a pitcher of hot water and the vapor inhaled three or four times a day in cases of *subacute* and *chronic bronchitis*. The dose by the stomach is 5 to 20 minims (0.35–1.5).

Recent clinical observations prove conclusively that guaiacol possesses powerful *antipyretic* influences. As pointed out by Sciolla in 1893, guaiacol when painted on the skin of a febrile patient causes a pronounced fall of temperature, which begins soon after the application is made, but is not fully accomplished for from two to three hours. The application may be made to the skin of the abdomen, thighs, or chest, about 30 to 40 drops (2.0–2.6) being used with a brush. When a full effect is required, it is well to place an impermeable dressing over the part painted to prevent evaporation and aid absorption. These applications may be resorted to as often as is necessary for the reduction of the fever, and, although the fall of temperature is sometimes very rapid and very great—as much as 7° F. in two hours—DaCosta has never seen serious nervous or cardiac symptoms produced, but other observers have noted such untoward results. The temperature is very apt to speedily rise after the reduction, and this rise is often preceded by a chill. These applications cannot supplant the cold bath, although they undoubtedly do reduce the temperature. The true sphere of usefulness to be assigned to guaiacol as an antipyretic seems to be that of a less valuable therapeutic measure than the bath, and one equally powerful and about as dangerous as are the antipyretic drugs of coal-tar derivation.

When used externally in the fever of *tuberculosis* its action is very satisfactory, but the presence of cavities contraindicates its use, it is said.

The studies of Stolzenberg show that if frequently and constantly used guaiacol produces in febrile patients a tendency toward depression. Thayer finds that great sweating and depression generally follow its external use in fevers.

Probably future reports will develop the fact that in cases of renal irritation guaiacol will prove harmful.

Guaiacol has been used by painting it on the affected part in the treatment of superficial *neuralgias*, and in deep-seated *nerve-pains*, as in sciatica, it has been given hypodermically in the dose of 2 minims in 10 minims of spirit of chloroform deeply into the neighborhood of the painful nerve.

If guaiacol is placed upon the skin by means of a small compress, which has been wet with it and bound tightly to the part, local anæsthesia is rapidly developed, but if it is left in place too long, it may be absorbed in sufficient amount to cause depression or a fall of temperature.

Belfield highly recommends painting the scrotum with guaiacol 15 minims (1.0) and glycerin 45 minims (3.0) for *orchitis*.

A serious objection to the external use of guaiacol is its disagreeable odor.

GUAIACOL CARBONATE.

Carbonate of guaiacol is a white, crystalline powder, consisting of 91 per cent. of pure guaiacol and 9 per cent. of carbonic acid. This powder is insoluble in water, neutral in reaction, and is said to be without any irritating effect on the stomach. Taken by the healthy individual, it is decomposed into guaiacol and carbonic acid in the bowel, but not in the stomach, and it is used for this reason, as salol is, as an intestinal antiseptic in the various forms of *fermentative diarrhœa* and *typhoid fever*. The drug is said to be slowly absorbed, but after absorption is rapidly eliminated. Its therapeutic applications in tuberculosis are practically identical with those of pure guaiacol, save that it is more readily borne by the stomach than the latter drug. Guaiacol carbonate may be given in capsule or pill, or it may be given in dry powder on the tongue in the dose of 2 to 10 grains (0.10–0.65). Usually in typhoid fever the dose is about 2 grains (0.10) every three hours, and in tuberculosis of the lungs 5 grains (0.35) three times a day.

HÆMATOXYLON.

Hæmatoxylon, U. S., Hæmatoxyli Lignum, B. P., or Logwood, is the heart-wood of *Hæmatoxylon campechianum*, a tree of the American tropics. It contains an alkaloid, hæmatoxylin.

Therapeutics.—Hæmatoxylon is a mild astringent, very useful in *serous diarrhœas* and in the diarrhœas of young children, as children do not dislike it, owing to its agreeable taste. (See article on Diarrhœa.) As it colors the stools and urine red, the nurse should be warned lest she be alarmed at the sight of what looks like blood on the diaper after the drug is given to infants. If the urine is alkaline, the color may be violet or red. In *leucorrhœa* its internal use is of service. The extract (*Extractum Hæmatoxyli, U. S.* and *B. P.*) is given in the dose of 8 to 30 grains (0.6–2.0), and *Decoctum Hæmatoxyli, B. P.* in the dose of 1 to 2 fluidounces (32.0–64.0). An unofficial fluid extract is often to be found in the shops. The dose of this is ½ to 2 fluidrachms (2.0–4.0). (See article on Diarrhœa.)

HAMAMELIS.

Hamamelis, U. S., Witch-hazel, or *Hamamelis virginiana*, is a plant of the United States, devoid of any true active principle, but possessing extraordinary remedial power.

Therapeutics.—Hamamelis is to be employed in *relaxed sore throat* resulting in congestion and hyperæmia upon exposure or where mild catarrhal states are present. Similarly, we employ it in an atomizer, after attacks of acute coryza, to tone up the nasal mucous membrane. The strength of the solution should be 20 to 60 minims (1.3–4.0) of the [illegible] extract to the ounce (32.0) of water. Hamamelis when taken [illegible] is often wonderfully successful in the treatment of *uterine* [illegible] small blood-vessels, seems to do good even in *hæmatemesis* [illegible] and *hæmoptysis*, and will sometimes arrest *hæmaturia* when all other remedies fail. Applied by means of cloths to *leg ulcers*, it acts very thoroughly and rapidly relieves the angry-looking skin surrounding the ulcer. In *bleeding from the bladder* it may be injected into this viscus daily in the form of the distilled fluid extract. Taken internally and applied locally, it is of value in the treatment of *bleeding* and the so-called *blind piles*. (See Hemorrhoids.)

Administration.—The one official preparation in the *U. S. P.* is the fluid extract (*Extractum Hamamelidis Fluidum, U. S.; Liquidum, B. P.*), dose 5 to 20 drops (0.35–1.30). The dose of the distilled extract, which is not official and is a perfectly clear liquid, is from 30 drops to 1 drachm (2.0–4.0), and this is much the best preparation for internal and external use. Unfortunately, the preparations of the drug vary very much both in odor and efficacy. Some of the proprietary preparations of witch-hazel are more active than those ordinarily dispensed in the drug-store. This is due to greater care in their preparation, and to the fact that they are sold in original packages without exposure to the air.

HOFFMANN'S ANODYNE.

Spiritus Ætheris Compositus, U. S. and *B. P.*, consists of alcohol, ether, and the heavy oil of wine. The writer has experimentally studied very thoroughly the action of the last-named ingredient, and finds:

First. That the belief in heavy oil of wine being the quieting agent in Hoffmann's anodyne is fallacious.

Second. The calmative effects of this mixture depend largely on the ether, rather than on the oil.

Third. It would seem probable that in Hoffmann's anodyne we possess an agent in which there are linked together three drugs of undoubted power, each one of which successively substitutes the other, stimulating the system in the order here named—viz. ether, alcohol, and the heavy oil of wine.

On animal temperature, as ascertained by the thermometer in the rectum, the heavy oil of wine exercises no influence, even when the arterial pressure is very low. That large doses of the heavy oil of wine are in no way possessed of toxic effects is proved by the fact that 30 cc. of the drug, given by the mouth to a small dog weighing twelve pounds, failed to produce any apparent symptoms, except, perhaps, to stimulate him slightly. While the odor of the oil is penetrating, it is by no means disagreeable, and it possesses but little taste other than that caused by the presence of an oily substance.

Therapeutics.—Hoffmann's anodyne is the best carminative that we possess for general use, and is one of the best remedies for *singultus* or *hiccough*. These effects are accomplished probably in two ways: The alcohol and ether act as irritants or stimulants to the intestine, and free peristalsis results, while the heavy oil of wine acts, perhaps, as a nervous sedative. In *angina pectoris* this drug is often the best remedy we have, and in the cardiac palpitation of *tobacco heart* or that arising from indigestion it is very useful.

In the nausea and depression seen after excessive smoking, Hoffmann's anodyne should always be given in capsules or in cold water, preferably ice-cold, in order to prevent too rapid volatilization of the ether and consequent difficulty in swallowing the liquid.

The dose is 1 to 2 drachms (4.0–8.0) to an adult.

HOMATROPINE.

Homatropine is an artificial alkaloid obtained by prolonged and gentle heating of a solution of equivalent quantities of tropine[1] and toluic acid in hydrochloric acid. The hydrobromate of homatropine (*Homatropinæ Hydrobromas*, *B. P.*) is a crystallizable salt of homatropine soluble in 10 parts of distilled water.

Hydrobromate of homatropine, properly applied by frequent instillations, is a reliable mydriatic for the correction of anomalies of refraction in healthy eyes. Experience is not at hand to determine its value for this purpose in eyes affected with retinal-choroidal disturbance. Atropine and hyoscyamine are preferred under such circumstances, for the obvious reason that their prolonged action is desirable as a method of treatment. The danger of systemic disturbance from homatropine is far removed, even when repeated instillations have been made, and its temporary action upon the pulse causes no inconvenience to the patient. Slight hyperæmia of the conjunctiva almost invariably follow its use, but true conjunctivitis, if it occurs at all, must be excessively rare. According to the studies of Dr. de Schweinitz and the writer, the drug has a physiological action closely allied to that of atropine, from which it is derived. Homatropine mydriasis generally lasts from thirty-six to forty-eight hours, that of hyoscyamine eight to nine days, and that of atropine ten to twelve days. For the production of ordinary mydriasis the drug should be used in solution of the strength of 4 grains (0.20) to the ounce (32.0) of distilled water, which is to be dropped into the eye every five or ten minutes. As the drug is expensive, only a few drachms of the solution of the strength named should be ordered for a patient.

HONEY.

Honey, or *Mel*, *U. S.* and *B. P.*, is the saccharine fluid deposited in combs by the honey-bee, or *Apis mellifica*. It is used to cover the taste of disagreeable medicines. When it is abstracted from a peculiar variety of flowers, it frequently has the odor of the flower, and when taken internally may even produce the physiological effects of the plant from which it is gathered. This accident occurs commonly in those parts of the country where the bees have had access to mountain laurel and similar plants.

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[1] Tropine is a product obtained by splitting up atropine into tropine and tropic acid.

Therapeutics.—Honey is used as a vehicle in gargles and to relieve *cough* and *dryness of the mouth and fauces.* When used as a gargle it very distinctly increases the secretion of the mucous membrane, and so relieves the congestion.

Under the name of *Oxymel* the *B. P.* recognizes a mixture of 8 parts of honey, 1 of acetic acid, and 1 of water. This is generally used as a vehicle for more active remedies in gargles or even for expectorant mixtures. Melted and strained honey, to which a small proportion of glycerin is added, is known as *Mel Despumatum, U. S.*, and *Mel Depuratum, B. P.* There are also a honey of roses (*Mel Rosæ, U. S.*) and a confection (*Confectio Rosæ, U. S.*), used as vehicles for other drugs.

HOPS.

Humulus, U. S., is the strobiles of ordinary hops, or *Humulus Lupulus.* These contain a liquid volatile alkaloid, lupuline, and a bitter principle, lupulinic acid. Hops are known under the name of *Lupulus* in the *B. P.* Much confusion has arisen in regard to the preparations of this drug, partly because Humulus is the official name in the *U. S. P.* and Lupulus in the *B. P.* This confusion has been increased by the fact that the alkaloid of hops is called lupuline, while the powder which is found on the strobiles is called lupulin. Those preparations in the *U. S. P.* having the word "humulus" in their name are made from the hops themselves, those with "lupulin" in their name from the powder of the strobiles.

Therapeutics.—Hops are used as *antispasmodics* and *nervous sedatives* in cases of *hysteria* and *nervousness.* In *priapism*, *vesical irritability*, and *renal irritation* they are of service. Even in *delirium tremens* they seem to be of value. For local application a hop poultice may be made by placing the powdered strobiles in the mass, and employed in this way they are a favorite home remedy for local *painful inflammations.* Hops have been used in the form of a hop pillow in *nervous insomnia*, but the soporific influence is largely imaginary or depends on the fumes of the alcohol with which the pillow is moistened.

Administration.—The tincture (*Tinctura Humuli, U. S.*) is given in the dose of ½ to 3 ounces (16.0–96.0). Lupulin (*Lupulinum, U. S.* and *B. P.*), which is the powder found on the strobiles of hops, is given in the dose of 2 to 5 grains (0.1–0.35) or more; the oleoresin of lupulin (*Oleoresina Lupulini, U. S.*) is given in dose of 10 to 40 drops (0.65–2.65) in capsules; and the fluid extract (*Extractum Lupulini Fluidum, U. S.*), in the dose of 30 to 120 drops (2.0–8.0). The preparations of the *B. P.* are the extract of hops (*Extractum Lupuli*), dose 5 to 10 grains (0.35–0.65); the infusion (*Infusum Lupuli*), dose 1 to 2 fluidounces (32.0–64.0); and the tincture (*Tinctura Lupuli*), dose ½ to 2 fluidrachms (2.0–8.0).

HOPE'S CAMPHOR MIXTURE.

This is a mixture originally made with nitrous acid, but largely used at present with nitric acid, owing to the fact that nitrous acid is changed into nitric acid when water is added to it. The nitrous acid is, however, more efficacious than nitric acid in the *serous or choleraic diarrhœas* which it is used to combat. The formula is as follows:

℞.—Acidi nitrosi	fʒj (4.0).
Aquæ camphoræ	f℥viij (256.0).
Et adde	
Tinct. opii	gtt. xl (2.65).—M.

S.—One-fourth of this in water every three or four hours.

HYDRASTIS.

Hydrastis, U. S., is the rhizome of the *Hydrastis canadensis*, containing two alkaloids, known as hydrastine and berberine, and, perhaps, xanthopuccin.

Physiological Action.—In poisonous doses hydrastis may cause convulsions followed by paralysis, according to the quantity of berberine or hydrastine present. The latter is more convulsive in its effects than the former. Upon the circulation hydrastine, when injected into the jugular vein, causes a primary fall of arterial pressure, succeeded by a decided rise, and the studies of Cerna have proved that it is an active poison producing spinal convulsions followed by paralysis.

Therapeutics.—Hydrastis is of service in *chronic gastro-intestinal catarrh*, particularly that following the abuse of alcohol, and may be used as a stomachic and tonic after malarial fever and similar depressing diseases. Wherever membranes exist in a condition of lowered tone this drug is indicated. Thus in *catarrhal jaundice* of a subacute type, in *uterine catarrh*, in *leucorrhœa* dependent upon a relaxed state of the vagina, and in *chronic nasal inflammations* and irritations it will be found useful.

Tincture of hydrastis is said to possess a distinct *antimalarial* influence.

One of the best remedial measures that we have in the later stages of *gonorrhœa*, when the acute period has passed, is the local and internal use of hydrastis. If it is used as an injection, 5 grains (0.3) of the commercial hydrastine to each ounce (32.0) of water should be employed twice a day. If this is not used, the following infusion will be found of service: Take 1 drachm of the powdered root and add it to 8 ounces of boiling water; ½ to 1 drachm of the fluid extract may also be added to a pint of water and used as a wash in *vaginal gonorrhœa* and *leucorrhœa*. In *chronic dyspepsia* hydrastis seems to act as an antiseptic and as a curative agent upon the mucous membranes of the stomach.

Administration.—The fluid extract (*Extractum Hydrastis Fluidum, U. S.; Liquidum, B. P.*) may be given in the dose of 5 to 30 drops (0.30–2.0), while the dose of the tincture (*Tinctura Hydrastis, U. S.*)

is from 30 drops to 2 drachms (2.0–8.0). The *Glyceritum Hydrastis, U. S.*, is used as a healing application to mucous membranes.

Much doubt exists as to the dose of hydrastine. This arises from the fact that two forms of it are sold. The most commonly seen is a dark-brown mass which is very impure, and contains berberine and other substances. Its dose is 3 to 10 grains (0.15–0.65). The pure hydrastine, as made by Merck, is given in the dose of ¼ to ½ grain (0.016–0.03). Hydrastinine hydrochlorate, an artificial alkaloid of hydrastine, has become official in the *U. S. P.* of 1890.

HYDROBROMIC ACID.

(See Bromides.)

HYDROCHLORIC ACID.

Acidum Hydrochloricum (*U. S.* and *B. P.*) is a clear, colorless liquid, possessing an acid odor and taste, devoid of astringency, but in concentrated form decidedly caustic. It should be kept in dark-colored bottles. In the strength of two-tenths of 1 per cent. it is normally present in the gastric juice, and aids the pepsin in the conversion of proteids into peptones and in the formation of pepsin from pepsinogen.

Therapeutics.—Hydrochloric acid is a much overrated remedy in dyspepsia. With new methods of studying gastric secretions we have learned that proper dieting and the use of lavage will do great good in ordinary dyspepsias, and this acid now finds comparatively rare and far more rational uses. These are its employments: to aid digestion during and after fevers, when this acid is apt to be absent from the gastric juice, particularly in *typhoid fevers*. In cases of *gastric cancer*, when this acid is always absent from the gastric secretion, and in the *sick stomach* following an alcoholic debauch, it is of great service. In some cases of *chronic gastric catarrh* in which there is atrophy of the gastric tubules, it should be used freely. The dose of the dilute acid (*Acidum Hydrochloricum Dilutum, U. S.* and *B. P.*) is 5 to 10 drops (0.36–1.3).

This acid is combined with nitric acid to form dilute nitro-hydrochloric acid (*Acidum Nitro-hydrochloricum Dilutum, U. S.* and *B. P.*), the dose of which is 10 to 30 minims (0.65–2.0); also the pure acid (*Acidum Nitro-hydrochloricum, U. S.*), dose 1 to 5 minims (0.05–0.35).

Hydrochloric acid causes, when taken in poisonous doses, violent *gastro-enteritis* and corrosion of the gastric walls, and its action should be combated by alkalies, soap, oils, and white of egg, and the use of opium to relieve pain and irritation.

HYDROCYANIC ACID.

Hydrocyanic or Prussic Acid is a transparent, colorless, very volatile liquid, giving rise to vertigo when inhaled in minute amounts and capable of producing death if the fumes be concentrated. If the bottle containing the pure drug be opened, it should be done where there is sufficient draught between windows to prevent any contamination of the atmosphere of the room by the acid.

Pure hydrocyanic acid is never used in medicine; the form employed is the dilute acid (*Acidum Hydrocyanicum Dilutum, U. S.* and *B. P.*), which contains about 2 per cent. of the drug. It must be kept in dark, tightly-stoppered bottles.

Physiological Action.—This is one of the most rapid (if not the most rapid) of the lethal poisons, only being approached by carbolic acid and nitrobenzole in the violence of its effects. Owing to its volatility, it is absorbed with great rapidity, and acts upon the respiratory centre and the heart, being eliminated almost immediately afterward. Because of its fleeting character, the survival of a patient twenty or thirty minutes after the ingestion of a poisonous dose is a favorable sign for his recovery.

The drug is an active paralyzant and exerts a lethal influence over every part of the body. The nervous system, heart, respiration, brain, and all vital parts are killed at once if much of it is present.

Poisoning.—When a lethal dose of hydrocyanic acid is taken, death either comes at once, so that the person drops dead to the floor with a gasp, is for a moment convulsed, the face cyanotic, the eyes wide open, with the teeth tightly shut, and the lips covered by a bloody froth, or three stages of poisoning may ensue if the dose has not been large enough to result in immediate death. In the first of these stages there are difficult respiration, slow cardiac action, and disturbed cerebration. In the second stage, which is convulsive, we find wild cries, dilated pupils, unconsciousness, vomiting, spasmodic urination and defecation, erections of the penis, and ejaculations of semen. In the third stage there are asphyxia, collapse, and paralysis, ending in death. The blood is found to be dark and venous-looking, but does not give the spectrum bands of cyano-hæmoglobin. These bands only appear when the drug is shaken with the blood outside the body.

The diagnostic signs of death from prussic acid are the odor on the body, the wide-staring eye, the clinched teeth covered with froth, and the livid, cyanosed face. If the body be opened, the odor of hydrocyanic acid is marked, but this rapidly passes away, owing to the volatility of the drug.

The only poisoning producing symptoms resembling those which have just been described is that produced by nitrobenzole or essence of mirbane, which has a somewhat similar odor, but which is, however, more permanent, the odor remaining in the opened body for hours.

Therapeutics.—Hydrocyanic acid is useful in cases of *gastralgia* of purely nervous origin, and in some cases of *nervous vomiting*, and in *irritable stomach*, where, owing to a hyperæsthesia of the mucous membranes, the taking of food produces discomfort.

In *irritable coughs*, due to tickling in the throat and bronchi, it is very extensively used, and has received high praise by those best qualified to judge. On the other hand, it has been claimed that owing to the extreme volatility of the drug it only acts for the moment, and that a dose every ten or fifteen minutes is necessary to produce any real effect. However this may be in theory, practically the acid certainly does aid in relieving cough. In these states the following prescription will be found of service:

℞.—Acid. hydrocyan. dil. . . . . f ʒj (4.0).
Syrup. pruni virg. . . . . f ℥iij (96.0).—M.
S.—Teaspoonful (4.0) every four or five hours to an adult.

In *enteralgia* or *neuralgia* of the intestines dilute prussic acid is often a very useful remedy.

Externally, the drug is useful in *pruritus* and other forms of *itching skin diseases*, and the following formula will be found of service in *pruritus vulvæ:*

℞.—Hydrarg. chlor. corros. . . . . gr. jss (0.09).
Acid. hydrocyanic. dil. . . . . f ʒj (4.0).
Aquæ amygdal. amaræ . . . . f ℥vj (192.0).—M.
S.—Apply to the itching surface with a small rag.

The same prescription may also be employed in pruritus without the bichloride, if so desired. The dose of dilute hydrocyanic acid is 1 to 5 drops (0.05–0.35). In certain forms of irritable cough inhalations of the vapor (*Vapor Acidi Hydrocyanici, B. P.*) are recommended; this is prepared by adding 10 to 15 minims (0.65–1.0) of the diluted acid to 1 fluidrachm (4.0) of water, which is then placed in a suitable apparatus from which is inhaled the vapor that arises.

HYDROGEN PEROXIDE.

Peroxide of Hydrogen is a clear, odorless, syrupy fluid of a specific gravity of 1.452, possessing a harsh, bitter taste. It is readily soluble in water, and its chemical formula is H_2O_2. Pure peroxide of hydrogen is never used in medicine, but in solutions of varying strength. The ordinary solution, as found in the shops and that now official (*Aqua Hydrogenii Dioxidi, U. S.*), is about 3 per cent., or, as it is generally called, a 10-volume solution. This term, "10 volumes," signifies that it can yield 10 volumes of available oxygen; and it is upon this yield of oxygen that its activity depends. The specific gravity of this official solution is 1.006 to 1.012 at 59°. The reaction is acid, but this is due to a small amount of acid added to the solution to preserve it. The official solution of peroxide of hydrogen, while the most stable that can be prepared, is nevertheless readily deteriorated by exposure to heat, sunlight, or prolonged shaking. If placed in an absolutely clean, smooth glass vessel, it may be concentrated for immediate use by exposing it to a temperature of 140° F.; but exposure to a temperature above this point may result in its decomposition with explosive violence. Practically, this means of concentration is not convenient for the practitioner, and the ordinary official solution fulfils all ordinary requirements unless it has deteriorated by age. The great difficulty in the use of the solution of the peroxide is its liability to undergo change and become practically worthless. Wallian states that as a rough test for the value of a given solution a few crystals of permanganate of potassium may be placed in a test-tube, and 1 or 2 drachms (4.0–8.0) of the solution added. The violence of the resulting effervescence is in direct ratio to its value as a remedial agent.

Therapeutics.—The most valuable use of the peroxide-of-hydrogen solution in medicine is in the treatment of *diphtheria*. So far as we know, it is the best application for the destruction and removal of the false membrane. There is no injury to the normal tissues, nor is there the danger of poisoning which sometimes follows the use of such drugs as carbolic acid. Applied to the false membrane, there is at once an active effervescence with some local tingling of the part. The membrane can afterward be removed in shreds. The solution should be applied by means of a swab or spray, but if the latter is used a glass atomizer must be employed, as the peroxide is decomposed by coming in contact with metals.

In the treatment of *abscess-cavities*, tubercular or septic in character, the peroxide of hydrogen is a very valuable application, and its use will often decide the presence of pus, since when it meets with this material active effervescence ensues. Similarly, it is a valuable preparation for cleansing ulcers and malignant growths which have ulcerated. The employment of the peroxide internally, with the idea that it will yield oxygen to the body in cases where this gas is lacking, is futile. Even if the oxygen entered the blood, the amount disengaged from a possible dose would be too small to be of any value.

It is stated that the application of this liquid to the spot suffering from a hornet's sting will give instant relief.

Where the peroxide is used as a gargle it may produce pain through its attacking cavities in the teeth or the metallic substances with which they are filled. Taken internally, the peroxide of hydrogen is not poisonous.

The internal dose of the *Aqua Hydrogenii Dioxidi* of the *U. S. P.* is from 1 to 4 drachms (4.0–16.0), well diluted with water, and taken from a porcelain, not a metal, cup or spoon. It possesses no distinct value in internal medication.

HYOSCYAMUS.

Hyoscyamus, *U. S.*, or Henbane, is a plant of the Northern United States and Europe. The leaves (*Hyoscyami Folia*, *B. P.*) only are used, and from them are obtained two alkaloids—one known as hyoscyamine, the other as hyoscine. The first has practically the same physiological action as atropine, save that it is much more sedative in its effects on the nervous system. (See Belladonna.) The second is quite different in its influence over the body. The only marked difference in the action of hyoscyamine and atropine is in the mydriasis produced by each. While that of atropine lasts, in man, from twelve to fourteen days, hyoscyamine generally remains for only seven to nine days. Sometimes the development of mydriasis is preceded by violent pain in the eye due to a cramp of the ciliary muscle. If so, the drug must be pushed to overcome the spasm. The strength of the solution to be used is 2 grains (0.1) to the ounce (32.0). Owing to the presence of hyoscine in hyoscyamus, it is more quieting and depressing to the nervous system than is belladonna.

Therapeutics.—Hyoscyamus is used in every condition indicating the employment of belladonna; or, in other words, wherever *local spasm* or *arterial relaxation* exists or where pain is due to *spasm.* It has been particularly recommended in *nervous cough*, in *whooping cough*, and in *colic*, and probably is better in its influences in these states than is belladonna. In combination with nitrate of silver the extract may be used with advantage in *chronic gastric catarrh.* In *urinary incontinence* due to *irritable bladder* it is very serviceable, and particularly is this true of this affection in children and old persons.

Administration.—The drug itself is official in four forms and as hyoscyamine sulphate and hydrobromate. The dose of the tincture (*Tinctura Hyoscyami*, *U. S.* and *B. P.*) is 30 drops to 1 drachm (2.0–4.0); the alcoholic extract (*Extractum Hyoscyami*, *U. S.* and *B. P.*), dose 1 to 3 grains (0.05–0.15); the alkaloid (*Hyoscyaminæ Sulphas vel Hydrobromas*, *U. S.*), dose $\frac{1}{60}$ to $\frac{1}{50}$ of a grain (0.001–0.0015); and the fluid extract (*Extractum Hyoscyami Fluidum*, *U. S.*), dose 5 to 30 drops (0.35–2.0). The *B. P.* preparation, besides those given, is the juice (*Succus Hyoscyami*), dose 30 minims to 1 fluidrachm (2.0–4.0).

Hyoscine.

This is one of the alkaloids derived from hyoscyamus, and is a powerful nervous sedative in some cases. Much if not all the so-called hyoscine of the stores is in reality scopolamine, derived from *Scopolia atropoides.*

Physiological Action.—Hyoscine quiets the cerebrum and produces deep sleep in a certain class of patients. In the lower animals or in man it may cause sleep or wild delirium. It causes loss of reflex action in overdose, which is due to paralysis of the spinal cord and not of the nerve-trunks. Upon the circulation it has little effect, but it is worthy of note that it does influence the vagus nerves, as does atropine, stimulating them at first, and finally paralyzing them, although the contrary has been asserted. In any event, the circulatory effect is a minor one. In cases where hyoscine has acted in excess, or where an overdose has been given, pilocarpine may be used as a physiological antidote in full doses if the heart is sound.

Therapeutics.—Hyoscine is of value as a *hypnotic* in a very limited class of cases, but in this class generally acts most favorably. These cases consist of those who, from acute mania, alcoholic mania, hysteria, or similar cause, suffer from *insomnia*, and perhaps use violent struggles against proper control or refuse to swallow or retain food.

The drug may be given to such persons, hypodermically, in the dose of $\frac{1}{100}$ to $\frac{1}{90}$ of a grain (0.0006), or by the mouth in the dose of $\frac{1}{90}$ to $\frac{1}{80}$ of a grain (0.0008). The fact that it possesses no taste and is small in bulk renders it readily employed. In some persons it utterly fails even in this particular type of cases.[1] In delirium tremens it may cause evidences of cerebral congestion and Cheyne-Stokes breathing. Some patients are not quieted by the drug, but pace up and down in a semi-sane condition until its action wears off. In the opinion of the writer the applicability of the drug is very limited indeed, and untoward effects are common.

Hyoscine is certainly of great value in *spermatorrhœa* and *nocturnal emissions.*

The drug is contraindicated in the sore throat of scarlet fever, as it may cause glottic spasm. In the insomnia of heart disease with nervousness it will cause sleep, but may also produce death by respiratory failure or cardiac arrest, and it is to be remembered that the drug will produce asthma rather than relieve it. The breathing in some persons may become under its influence croupy or rasping.

Hyoscine is an uncertain remedy in nervous affections, sometimes acting very well, at others producing very alarming symptoms in cerebration, circulation, and respiration.

Hyoscine is official in the form of *Hyoscine Hydrobromate* (*Hyoscinæ Hydrobromas, U. S.*).

HYPNAL.

The chemical name of this substance is monochloral-antipyrine, and it is, as its name indicates, a compound of chloral and antipyrine. There is also a dichloral-antipyrine, which contains more chloral. The compound is employed in treating those patients who suffer from pain and insomnia combined, the antipyrine relieving the pain and the chloral producing sleep. Opium is the only drug known which can be relied upon to act in this double manner, and the disadvantages of that medicament are often so prominent as to prevent its use. In *cough* arising from bronchitis or phthisis, and causing by its constancy loss of sleep, and in *neuralgic insomnia*, hypnal will be found of service. The dose is from 5 to 20 grains (0.35–1.3), best given with simple syrup and water or with syrup of orange-peel, or it may be used as follows:

℞.—Hypnal	gr. xv (1.0).
Chartreuse	fʒj (4.0).
Distilled water	f℥ss (16.0).—M.

S.—The entire amount to be taken in one dose.

ICHTHYOL.

The substance sold in the shops and employed in medicine under the name of ichthyol is really a salt formed by the bibasic acid, ichthyo-sulphuric or sulpho-ichthyolic acid with ammonium. In other words, it is ammonium ichthyol, which is a semi-solid substance. The ichthyo-sulphuric acid itself is derived from a crude oil, which in turn is obtained by destructive distillation from a deposit of fossil fish found in the Tyrol Mountains. When combined with sodium, forming sodium ichthyol, a more solid substance than ammonium ichthyol is formed, which can be employed if it is desired to use the drug in pill form. Both the ammonium and sodium ichthyol contain about 10 per cent. of sulphur, and it is largely upon this that their therapeutic activity depends. They are both soluble in water, and have a dark-brown, tarry appearance. Their disagreeable odor depends upon an inseparable volatile oil.

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[1] The writer has given one-tenth of a grain of Merck's hyoscine in twenty-four hours, obtained from two different and reliable stores, without producing sleep, although the respirations were much quickened.

Therapeutics.—Ichthyol is without doubt one of the most remarkable substances introduced for medicinal purposes within the last few years, both because of its curious origin and its therapeutic value in a large variety of ailments. In the author's hands it has proved most efficacious in the treatment of the inflamed areas in *acute articular rheumatism*. When used in this disease an ointment composed as follows is to be smeared over the inflamed part, and then spread on lint, which is wrapped about the limb. This usually relieves the pain and tenderness of the part to a great extent. The same application, accompanied by rubbing or applying massage to the joint, is of value for the pain and stiffness met with after the acute manifestation of the disease has passed by:

℞.—Ichthyol	ʒij (8.0).
Ol. citronellæ	gtt. xv vel xxx (1.0–2.0).
Adipis	℥j (32.0).—M.

Sometimes the quantity of ichthyol in this prescription can be increased to three or four drachms with advantage. The same prescription is also the best external treatment of *erysipelas* that we have. The skin should be carefully and gently washed, and then anointed with the ointment and covered by lint smeared with this ointment. If the disease be in the skin of the face, holes are to be cut in the lint for the mouth, nose, and eyes. Ichthyol is also a very useful drug in the treatment of *chronic skin diseases* associated with atony and induration of the deeper layers of the skin, such as acne, eczema, and even lupus and keloid in their chronic stages. It is always better to use ichthyol in ointment form, but some practitioners have employed it by painting it on in watery solution with a camel's-hair brush. In *frost-bites*, *chilblains*, and in *burns* it is of service, and Agnew has recommended it highly when rubbed into *lymphatic enlargements*. Ichthyol has proved remarkably efficacious in removing *peri-uterine* and other *pelvic exudations* when used as a salve or in a vaginal suppository.

For *acute sprains*, and for the removal of the swelling following such injuries, its influence is extraordinary if it be well rubbed into the part affected.

In severe cases of cracked nipples, with much induration, an ointment of ichthyol, 1 drachm to 4 (4.0–16.0) of lanolin, will prove of value, but it must be wiped off before each nursing or the child will not take the breast. Often the odor remains and prevents nursing.

The dose of ichthyol internally is 1 to 10 grains (0.05–0.65), given in pill.

Untoward Effects.—Bergerio and Peroni have both reported disagreeable symptoms from the intra-uterine application of ichthyol after curetting. As the drug ought not to be so used, such reports are of little practical value.

IODIDE OF AMMONIUM.

(See AMMONIUM IODIDE.)

IODIDE OF ETHYL.

(See ETHYL IODIDE.)

IODIDE OF POTASSIUM.

The physiological effects of iodide of potassium (*Potassii Iodidum*, *U. S.* and *B. P.*) are entirely comparable to those of iodine itself (see Iodine), but it is employed for somewhat different purposes, is less irritant, more readily given, and perhaps more readily absorbed. When it is given in very large doses or for a long period of time, the fact that the potassium base is a depressant poison is to be remembered, and it is well to use iodide of sodium instead.

Physiological Action.—CIRCULATION.—Upon this part of the system when in health iodide of potassium produces effects differing very slightly, if at all, from those caused by potassium itself. Small amounts raise the blood-pressure, and large quantities lower it (Prevost and Binet), but if atheroma of the blood-vessels be present with high arterial tension in association with it, iodide of potassium acts as a valuable remedy in reducing the vascular spasm. It therefore lowers arterial pressure.

ABSORPTION AND ELIMINATION.—Iodide of potassium is very rapidly absorbed and eliminated, appearing in the urine, according to Doux, in thirteen minutes after it is ingested, and the daily amount excreted equals about 80 per cent. of the dose taken. All traces of the iodide in the urine cease four or five days after the last dose is administered (Elhers).

Therapeutics.—The medicinal uses of iodide of potassium may be divided into three great divisions, each of which is important. It is also employed for many conditions not included in these classes:

1. SYPHILIS.—The use of iodide of potassium in syphilis is recognized as a part of all treatment for its relief. Elsewhere Dr. Martin has, in his excellent article (see Syphilis), treated of this question, and it is only necessary to call attention to the fact that the drug is generally well borne in large amounts by advanced syphilitics, although this is not always the case. The term "therapeutic test" is applied by one eminent teacher to signify a state of the system produced by syphilis in which a diagnosis may be made by the fact

that large doses of the iodide are borne without inconvenience. This resistance does not always prove the presence of syphilis, nor does the absence of this resistance prove the absence of this disease. Persons having hereditary asthma, gout, rheumatism, or some similar diathetic malady often resist the iodide, and, on the other hand, some syphilitics are affected with "iodism" after very small doses. In treating syphilis the drug should be used in the dose of 10 grains (0.65) three times a day, and this amount gradually increased a grain a day until symptoms of "iodism" occur.

The quantity borne often amounts to from 100 to 200 grains (6.0–13.0) a day, and as much as 400 grains may be taken by some persons. The best way to use the iodide of potassium is to order for the patient a saturated solution of the drug, which contains in each drop about 1 grain, and at the same time a bottle of the compound syrup of sarsaparilla. To a tablespoonful of the latter the patient is to add the iodide solution, beginning with 10 drops (0.65) three times a day, and increasing a drop every twenty-four hours.

The iodide acts more slowly as an antisyphilitic than does mercury. In *tertiary syphilis* the iodide is invaluable.

In *nervous syphilis*, be its manifestations what they may, iodide of potassium is the standard remedy, only being supplanted by mercury when it is necessary to break down a growth whose existence is a daily menace to the patient's life, as, for example, a brain tumor which causes pressure near vital areas. It is not of value in sclerotic post-syphilitic changes nor in locomotor ataxia due to syphilis, except in the earliest stages.

2. METALLIC POISONING.—Owing to the fact that iodide of potassium forms double soluble salts with all the metals in the tissues in chronic poisoning, thereby aiding in their elimination, it should always be employed in chronic lead, zinc, arsenic, or mercurial poisoning.

3. ANTIRHEUMATIC.—Iodide of potassium is best suited, not to the acute sthenic stages of *rheumatism*, when the joints are very hot and painful, but to the secondary or subacute periods, when the joints are large and the case "hangs on"—now better, now worse. It acts best, under these circumstances, if combined with wine of colchicum-root. (See Rheumatism.) It is also to be tried in *sciatica*, *lumbago*, and *rheumatic neuralgia*, and it may be employed in *chronic pleurisy*, *pericarditis*, and *hydrocephalus* to cause absorption of the fluids. In these conditions, however, it often fails and cannot be relied upon.

In *aneurism*, particularly that of the aorta, the drug often does good, but its value rests largely upon the cause of the disease. If it is due to syphilis, the aneurism may yield very rapidly to the drug, and the pain, swelling, and pulsation gradually decrease.

In *asthma* iodide of potassium is valuable if the disease is of the pure bronchial type, but it ought not to be employed if the cause is associated with gastric irritation or indigestion, as it makes the condition of the stomach worse. In *bronchitis* and *intestinal catarrh* where the condition of the mucous membranes is semi-chronic, and not relieved by chloride of ammonium, iodide of potassium should be used. If the bronchitis is chronic and the secretion profuse (bronchorrhœa), iodide of potassium will make it worse. The dose for an adult in all these instances should be about 3 to 5 grains (0.15–0.3) three times a day. In *pulmonary emphysema* iodide of potassium is often of great value.

In *chronic nephritis* small doses (5 grains (0.35) t. d.) are thought by some to check the disease, but it is to be remembered that the drug may produce poisoning if the kidneys do not eliminate it, so that, if used at all, it must be given with great care. If the drug is well borne, it will cause an extraordinary increase in the urinary flow, and will relieve very rapidly indeed any dropsy which may be present.

In *bronchocele* the employment of iodide of potassium internally and tincture of iodine externally is the best treatment we can use, and in *acute coryza*, or "cold in the head," 10 grains (0.65) of the iodide taken at the beginning of the trouble will often abort the attack.

In *hepatic cirrhosis*, in its early stages, the iodide often does good, and in *arterio-sclerosis* or *atheroma* of the blood-vessels it is of great service, according to many English, French, and American writers. Thus in the latter conditions a combination of iodide of sodium or potassium with a little digitalis will relieve vascular spasm and support a feeble heart.

A very important use of iodide of potassium is for the removal of *enlargements of the cervical glands* and those occurring in other parts of the body. In *enlargements of the spleen*, malarial or otherwise, external paintings with iodine and the internal use of the iodide in small doses are of service. In the later stages of *pneumonia* the iodides are useful to aid in the absorption of any exudates, but they are contraindicated in phthisis, except in the fibroid form and in those cases which are dependent upon syphilis as an underlying dyscrasia, as they aid in the breaking down of the lung.

Untoward Effects.—In some persons, after the use of the iodide, coryza with a tearful condition of the eyes comes on, so that the edges of the lids become reddened and the nose runs constantly. This is followed, if the drug is pushed, by the more positive signs of "iodism" spoken of under Iodine.

In other cases acne breaks out on the face and disorders of digestion and gastric irritability come on. The acne can nearly always be prevented by giving arsenic at the same time with the iodide. In some cases petechial rashes break out on the legs, while in others great mental and physical depression appears, so that listlessness or melancholia may develop. Sometimes iodide of potassium causes diarrhœa.

In persons susceptible to iodide of potassium care should be exercised when it is first administered lest sudden and dangerous œdema of the glottis occur. Elsner has reported a case in which death due to this cause followed the administration of 30 grains of the iodide of potassium. Multiple hemorrhages from the skin and mucous membrane occurred.

If bullæ or blebs follow the use of the iodides or other rashes appear, it is said that atropine will afford relief.

Sometimes the iodide of ammonium or iodide of sodium will be borne when the iodide of potassium will not.

Administration.—The iodide of potassium, owing to its exceedingly disagreeable taste, should be given with the compound syrup of sarsaparilla, extract of liquorice, or in milk. Large amounts of these vehicles are to be used. A good way to give it, when the physician fears it will disorder the stomach, is to add the drug to one of the liquid pepsins, and then to add this to warm milk, as in the directions for the preparations of junket given in Part III. The curd completely covers the taste of the drug, as was first noted by Delavan of New York. The dose usually varies from 5 to 60 grains (0.35–4.0) three times a day, according to the condition of the patient.

One of the best ways to take the drug is in capsule, but if this is done a drink of milk or water or other fluid should precede or follow it, in order to prevent the drug from coming in contact with the stomach in concentrated form. The preparations of the iodide of potassium are—*Unguentum Potassii Iodidi, U. S.* and *B. P.*, and the liniment (*Linimentum Potassii Iodidi cum Sapone, B. P.*). The former should always be freshly prepared.

IODIDE OF SODIUM.

Sodii Iodidum, U. S. and *B. P.*, is used in the same doses and for the same purposes as the iodide of potassium, and is less irritant than the latter salt, as well as less depressant to the general system.

IODINE.

Iodum, U. S. and *B. P.*, is a non-metallic element found largely in seaweed and in mineral iodates and iodides. It is soluble in ether and alcohol, but slightly so in water, and possesses an acrid, burning taste and a neutral reaction.

Physiological Action.—The physiological action of iodine, so far as its alterative powers are concerned, is absolutely unknown. Applied to the skin, it stains it yellow, brown, or black according to the freedom of its application, and it acts without pain if the skin is intact. If very large amounts are used, it produces vesication. Upon mucous membranes iodine acts as a powerful irritant. Germain-Sée believed it to be a stimulant to the nutritive processes of the body and to the circulatory system, and he was certainly correct in regard to the influence it exercises over nutrition.

Absorption and Elimination.—The drug is rapidly absorbed, escapes from the body chiefly through the kidneys, the skin, the salivary glands, and it even appears in the milk of nursing women to such an extent that the nursing infant may be affected by iodism and suffer from gastro-intestinal disturbance in consequence of ingesting it.

Poisoning.—The symptoms of acute poisoning by iodine are those of acute gastro-enteritis, such as severe pain in the œsophagus, stomach, and abdomen, accompanied by violent vomiting and purging. An early symptom is the persistent strong metallic taste in the mouth, with markedly increased salivation. The pulse becomes rapid, running, and feeble, the face deathly pale, total arrest of urinary secretion takes place through renal irritation, and death occurs by failure of respiration, which is accompanied by loss of all vital power.

If the poisoning is not severe enough to cause death at once, a fatal result is, nevertheless, reached after a few days by reason of a widespread fatty degeneration of the tissues which iodine often produces.

The *treatment* of the poisoning consists in the use of large amounts of starch in any of its forms as the antidote, the employment of emetics and the stomach-pump, the application of heat to the body and extremities, and, finally, the employment of hypodermic injections of alcohol, digitalis, and atropine or strychnine for the purpose of maintaining the strength of the circulatory and respiratory systems.

Untoward Effects.—Under the name of "iodism" the profession recognizes a state of the body brought on by the prolonged and excessive use of iodine in any of its forms. The earliest notable signs of this state are a peculiar metallic taste in the mouth, particularly before breakfast, slight tenderness of the teeth and gums, increase of salivary secretion, a little morning nausea and a lack of appetite for breakfast, and perhaps some coryza or evidence of gastric irritation. Acne rosacea often comes on very early during the use of full doses of iodine. If the drug is continued, all these symptoms become more marked and the coryza becomes intense. Headache under the frontal bone and sore throat often appear, and the pustular and bleb-like changes in the skin go on to active suppuration. Sometimes large boils appear or purpura hæmorrhagica comes on. Slight catarrhal fever may develop.

In other cases the nervous system chiefly suffers. Twitchings of muscles, neuralgic pains in the trunk and extremities, and wasting of the testicles, mammæ, and all other tissues occur as the result of trophic disturbances. Anæmia amounting to an actual cachexia is commonly produced. Loss of vision and paralysis may ensue in extreme cases. Soullier asserts that albuminuria may be developed in children after tincture of iodine is applied to the skin by reason of its absorption and irritation of the kidneys.

Therapeutics.—In all cases where the system is in a state of chronic perverted functional activity, as in those diseases associated with disorder of the processes of nutrition, and often included under the single name of *scrofulosis*, iodine is of service. In *enlargement of the lymph-glands* it is, in its various forms, one of the best remedies we possess, but it ought not to be employed in those cases where rapid changes are going on in the gland, such as the formation of pus, since under these circumstances it will increase the size of the gland. The drug ought never to be used in rapid phthisis, because it tends to disintegrate the tissues, and this is precisely what the disease is doing. In the exceedingly chronic form of pulmonary disease known as *fibroid phthisis* iodine may be used. When inhaled in fumes it may be of service as a stimulant to the mucous membranes, but is practically useless in phthisis so far as combating the true pathological changes is concerned. In countries where *exophthalmic goitre* is very common iodine ranks as a most efficient but a dangerous remedy. In cystic or vascular enlargement of the thyroid gland it is valueless, but in simple hypertrophy of the gland iodine is of great value. To accomplish the best results it must be injected by means of a hypodermic needle into the gland. The usual dose is 10 to 15 drops (0.65–1.0) every second or third day till twenty or more injections have been used. Meltzer states that while this treatment is sometimes efficacious, it is not by any means devoid of danger, for at least thirty deaths have resulted from it.

In *chronic bone disease* iodine applied about the affected joint in the form of the ointment diluted one-half with lard, or in the pure tincture, will be found of service, and if *anæmia* exists the syrup of the iodide of iron should be given internally.

The other uses of iodine externally are many and important. As a slow counter-irritant, which does not produce pain if properly employed, it is particularly useful in children, and may be employed in one to three coats, applied by means of a camel's-hair brush, and no more.

The proper way to use the tincture of iodine as a local counter-irritant is to give one good black coat at one sitting, and not to repeat it until the skin has desquamated and become well renewed. If iodine is applied soon after one good effective coat, it will cause agonizing burning pain, which nothing will relieve except the removal of the iodine by the use of cologne-water, alcohol, whiskey, or gin. The application of any of the latter liquids causes such an increase in the pain as to be almost useless after the skin is broken. The best lotion for its removal is one of iodide of potassium, which should be followed by a starch poultice. A good rule to follow is never to cause pain by the use of iodine, as the drug acts equally well if applied in such a way as to avoid suffering.

Iodine in the form of the tincture is applied as a counter-irritant paint to the skin of the chest in *pleurisy*, both to abort an attack and to aid in absorption of the fluid after it is passed out into the chest. In *harassing irritative cough* it may be painted over the supraclavicular spaces, and it will lessen the secretion in *chronic bronchitis* if used in this way. In *chronic rheumatism* affecting the joints and muscles it does good when locally applied. Often in *synovitis* the local application of iodine causes increased swelling for some days. This should not cause alarm, for ultimately the swelling decreases very greatly, and the cases in which this occurs are generally the best from a prognostic point of view.

In the course of *phthisis* every now and then a "spot" in the chest will become "sore," probably due to a limited area of pleurisy, and under these circumstances tincture of iodine locally applied will give relief. In *lupus* the tincture may be painted around the edges of the growth, and even over its surface, with the object of retarding its spread. In *chilblains* an application of iodine ointment gives the greatest relief if diluted one-half with lard, and its use is probably the most efficacious measure at our disposal. In certain individuals who have "pains in the chest" iodine ointment may do good if rubbed in over the affected spot. As has been pointed out by others, iodine does good if muscular tenderness is present, while it fails if *pleurodynia* or *intercostal neuralgia* is the cause of the suffering. The latter troubles should be removed by the use of belladonna. In certain forms of skin diseases, such as *tinea tonsurans* and *circinata*, tincture of iodine may be applied with a camel's-hair brush, and even the entire scalp may be painted. A better way is to apply it to different spots each day. When *erysipelas* is present, the tincture may be painted around the edges of the inflammation in order to prevent its spread.

In old persons or those in middle life *retraction of the gums* from the teeth sometimes comes on, and Stillé recommends for this disorder the use, by means of a camel's-hair brush, of a watery solution of iodine of the strength of 1 grain to the ounce (0.05 : 32.0), to be followed at once by a thorough rinsing of the mouth with pure water. In *hydrocele* iodine in the form of the tincture is the best remedy for effecting a permanent cure that we have. The sac should first be emptied by the use of a trocar and canula, and the iodine alone or mixed with glycerin injected with a syringe, and then allowed to escape. As the pain is most atrocious, the patient should first be put partly or entirely under the influence of ether or other anæsthetic.

In *white swellings* and *ovarian tumors* as much as 10 ounces (320.0) of the tincture may be injected, but it is to be remembered that certain dangerous symptoms may arise. After the injection of tincture of iodine into the pleural cavity in cases of hydrothorax violent symptoms of poisoning have come on in some cases, the most common complication being convulsions. These are epileptiform in character and are followed by coma or collapse.

In *empyema* a solution of iodine 6 grains (0.37), iodide of potassium 6 grains (0.37), and water 1 pint (500 cc.), may be used daily as an irrigating fluid with good results.

The tincture of iodine may be used, according to Ringer, as an inhalation with signal benefit in the following three instances:

1. In the chronic forms of phthisis (*fibroid lung*). When the expectoration is abundant and when the cough is troublesome, its inhalation, used both night and morning, will generally lessen the expectoration and allay the cough.

2. In children six to ten years of age, who after meals, or, independently of them, on exposure to cold, are seized with hoarseness, a hoarse, hollow cough and some wheezing at the chest. This affection, involving the larynx, trachea, and larger bronchial tubes, and often proving very obstinate, is apt to return and to persist a considerable time.

3. Some persons suffer with *itching of the nose*, of the inner canthus of one or both eyes, *sneezing*, *running at the nose* of a watery fluid, weeping of the eyes, and *severe frontal headaches;* and these patients of various ages are greatly troubled, often for many years, with daily attacks of this character, lasting, it may be, several hours. Iodine inhaled often removes this affection at once, lessening the headache and discharge from the nostrils. Its effect is most marked in respect to the itching.

Ringer generally adopts the following simple, handy, cleanly, and effectual plan of inhalation: Heat well a jug capable of holding about 2 pints, by rinsing with boiling water, then partly fill with boiling water, into which pour 20 to 30 drops (1.3–2.0) of the tincture of iodine, then direct the patient to put his face over the mouth of the jug and breathe the iodized steam, covering the head to prevent the escape of the vapor. This inhalation should be used night and morning for five minutes or a little longer. Occasionally an excess of iodine will temporarily produce a sensation of soreness in the chest and throat, accompanied with redness of the conjunctiva, running from the nose, and pain in the head.

In some cases of *acute coryza* much relief may be obtained by sniffing the fumes of tincture of iodine from a bottle, as in the use of "smelling salts." The heat of the hand is sufficient to disengage the vapor in proper quantity.

Administration.—Iodine is never used in solid form, and it has been taught that the tincture (*Tinctura Iodi*, *U. S.* and *B. P.*) should not be given internally, on the ground that it is precipitated in the stomach. Whether this be true or false, it is a fact that the tincture has recently been largely used in the *vomiting of pregnancy* with very good results. The dose is 5 to 10 drops (0.35–0.65), well diluted. Under the name of Lugol's solution (*Liquor Iodi Compositus*, *U. S.*) iodine is frequently used internally; the dose is 5 to 10 drops (0.35–0.65), in water. The *B. P.* preparations not official in the *U. S. P.* are the liniment (*Linimentum Iodi*), the solution (*Liquor Iodi*), and *Vapor Iodi*, which is prepared by adding 1 fluidrachm (4.0) of iodine to 1 fluidounce (32.0) of water, which is gently heated and the rising vapor inhaled.

Within recent years a so-called colorless tincture of iodine has been sold which has obvious advantages, and is made by the following process, according to Curtmann and Aiken of St. Louis: Take of iodine 1½ ounces (48.0), alcohol 13 fluidounces (416.0), of stronger water of ammonia 3 fluidounces (96.0). Dissolve the iodine in the alcohol and add the ammonia. Allow to stand for four weeks with repeated shaking. Or the preparation may be made hastily by using an excess of ammonia, and afterward cautiously adding enough hydrochloric acid to render the liquid only feeble alkaline. Iodide of nitrogen may be precipitated, which is explosive.

Unguentum Iodi, *U. S.* and *B. P.*, is used locally over enlarged glands. In the case of children or adults who have delicate skins the ointment should be diluted one-half with lard. This ointment should always be freshly made.

Contraindications.—Iodine is contraindicated in renal diseases, except in small doses, during the progress of acute inflammation, and whenever tissues are rapidly undergoing degenerative changes.

IODOFORM.

Iodoform (*Iodoformum*, *U. S.* and *B. P.*) occurs in small saffron-colored crystals which possess a powerful characteristic, penetrating odor and strong taste. It is soluble in alcohol, ether, chloroform, benzol, and in fixed and volatile oils, but is insoluble in water.

Physiological Action.—The effects of iodoform upon the circulation, respiration, and other vital functions are very slight when the drug is used as a surgical dressing in ordinary amounts or when it is given by the mouth in average doses. It acts as an anæsthetic upon mucous membranes, and produces those changes which we are wont, for want of a better term, to call "alterative," in the tissues with which it comes in contact. Iodoform is eliminated in the urine as iodine or as alkaline iodides, chiefly iodide of sodium. The drug also escapes by the saliva.

Poisoning.—If applied to an absorbing surface in susceptible individuals, iodoform may cause general systemic poisoning. This poisoning may be mild, in which case we have a general feeling of malaise, with nausea and the perception of various odors which are in reality not present. There may be headache and vomiting. If the system is still more impressed by the drug, these symptoms are followed by cerebral excitement, insomnia, loss of memory, loss of appetite, and a rapid pulse. In very grave cases convulsive movements and maniacal delirium, alternating with coma, may be the dominant symptoms. The pulse is small and rapid, and there is often retention of urine or hæmaturia. Loebisch asserts that the mental excitement cannot be quieted by narcotics. If death occurs, the heart and respiration fail simultaneously. In addition to the fatty degeneration which such poisoning produces in all the vital organs, there is sometimes found an œdematous condition of the pia mater or a low-grade leptomeningitis. These symptoms seem to occur more commonly in the aged. In the graver cases the onset of the poisoning is apt to be sudden, though from twenty-four hours to several days usually elapse between the application of the drug and the onset of the symptoms of poisoning.

TREATMENT of the poisoning by iodoform consists, according to Soullier, in the administration of bicarbonate of sodium to unite with the iodine and so aid in its elimination; the use of alcoholic stimulants to support the system; the employment of diuretics, and wrapping the patient in hot blankets to encourage free sweating, so relieving the kidneys. Kocher advises saline transfusion in such cases.

Untoward Effects.—It is not to be forgotten that iodoform when applied as a dressing may produce less violent symptoms than those just described, and capable, because of their aberrant character, of seriously misleading the physician. Thus a scarlatinal rash may develop with fever, malaise, and nervous disturbances.

Therapeutics.—Iodoform is used chiefly as a surgical dressing. It is antiseptic, but not germicidal. Germs may be found in powdered iodoform, and will even grow in it. When used locally, the drug does good by absorbing the liquids of the wound, and thereby removing the nidus for germ-growth, and when applied to large moist surfaces gives off free iodine and acts as well as a protective. There can be no doubt that iodoform when applied to a wound does good, not by destroying the bacteria directly or indirectly, but by inducing chemical changes in their toxines.

In *syphilitic sores* the following dressing will be found of great service: Iodoform, 20 grains (1.3); oil of eucalyptus, ½ fluidounce (16.0); or a powder of iodoform ½ an ounce (16.0), camphor 75 grains (5.0), and essence of roses 2 drops (0.1), may be employed. In eczema, with tingling and itching, the following application will give relief (Ringer):

℞.—Iodoformi	gr. iv (0.2).
Olei eucalypti	fʒj (4.0).
Petrolati	℥j (32.0).—M.

S.—Apply locally.

Internally, iodoform is used in *tertiary syphilis* in all its forms in the dose of from 1 to 5 grains (0.05–0.35). Bartholow recommends it most highly in *catarrhal jaundice* and in the early stages of *hepatic cirrhosis;* indeed, he thinks its persistent use in small dose will cure the latter affection.

The influence of iodoform upon the tubercle bacillus is very great, and it is now largely used in the treatment of *tubercular disease of the joints and pleuræ.* The pus is allowed to escape under antiseptic precautions; the cavity is washed out with warm boric-acid or carbolic-acid solutions of low strength, and from 1 to 6 drachms (4.0–24.0) of an emulsion of iodoform and sterilized sweet oil are injected and allowed to remain. The strength of the iodoform-and-oil emulsion should usually be 10 per cent. Should the abscess-cavity fail to heal after these injections have been repeated every few days for some time, it must be reopened, scraped, and injected again or packed with iodoform gauze. The iodoform also promotes healing through its alterative influence, which aids in the absorption of the inflammatory exudate. Should tubercular glands be present, injections may be made into them even if pus has not formed.

Used by means of a powder-blower, iodoform will often relieve the hoarseness and discomfort of *laryngeal phthisis*, but it must be pulverized most minutely. Sometimes a spray may be used, which should consist of spirits of turpentine and sweet oil, half-and-half, and contain 2 grains (0.10) of iodoform to each ounce (32.0). This mixture may also be used in chronic *bronchial catarrh* to lessen the cough and fœtid discharge. In the early stages of phthisis several clinicians claim to have reached very good results by the daily hypodermic injection into the back of 30 minims (2.0) of a 1 : 100 solution of iodoform in oil of sweet almonds, but this treatment has not generally found favor, in this country at least.

For *fissure of the anus* and *irritated hemorrhoids* 5 grains (0.35) of iodoform in a suppository may be placed in the rectum, and after it has remained there a few minutes defecation may he had without pain. The pain following operations on the female perineum may also be much relieved in this manner. In the *tenesmus* of *cholera infantum* an injection of 1 ounce (32.0) of sweet oil with 5 grains (0.35) of iodoform will give great relief if used after or before enteroclysis.

Administration.—The ointment of iodoform (*Unguentum Iodoformi, U. S.* and *B. P.*) is useful when applied over fœtid sores. It should always be freshly made. The drug itself may be given in 1- to 5-grain

(0.05–0.35) doses three times a day. The suppositories (*Suppositoria Iodoformi*) are official in the *B. P.*; each one contains 3 grains (0.15) of iodoform.

IODOL.

This is a dark, dirty-yellowish-looking powder, soluble in alcohol, ether, and oils, but only slightly so in water. Its uses in medicine are identical with those of iodoform, and it possesses the advantage of being not so penetrating in odor as the latter drug.

In *tubercular laryngitis* the powder may be blown into the larynx without disagreeable results and with a favorable effect on the diseased process. Cerna has found iodol of very great service in *diabetes* when given internally, in the dose of from 2 to 6 grains (0.1–0.3) three times a day, and it is said to be of value in *tertiary syphilis* in the same quantity.

A very useful antiseptic dressing for small wounds and abrasions is made by adding 1 part of iodol to 10 parts of ether and 5 of gun-cotton, thereby preparing an iodol collodion.

Ingalls recommends the following prescription in cases of eczema or abrasions of the upper lip and nostrils:

℞.—Acid. carbolic.	♏vj (0.3).
Ol. rosæ	♏v (0.3).
Iodol	gr. xxv (1.65).
Lanolin	℥ss (16.0).—M.

IPECACUANHA.

Ipecacuanha, *U. S.* and *B. P.*, or Ipecac, is the root of *Cephaëlis Ipecacuanha*, a small shrub of Brazil. It contains an alkaloid, emetine, and ipecacuanhic acid.

Physiological Action.—Locally applied to mucous membranes, ipecac acts as an irritant, and if applied for a long period to the skin produces vesicles and irritation. Very minute doses have little noticeable effect, but large ones produce nausea, relaxation, vomiting, free secretion into the bronchial tubes, and a profuse flow of saliva. The emesis is due both to the irritation of the stomach and to an effect upon the vomiting centre in the medulla. The drug acts as a depressant to the spinal cord (Pecholier), and it also depresses the heart if given in large doses and retained by the stomach. Ipecac is eliminated by the kidneys, the gastro-intestinal mucous membrane, and the skin (Binz).

If emetine is given in lethal dose to one of the lower animals, death is due to failure of respiration.

Therapeutics.—Ipecac is used as an emetic where a fairly rapid action is required. It is particularly useful in cases where the stomach of a child is overloaded with food. In cases of poisoning it is hardly active or rapid enough as an emetic, and is not as good as mustard or sulphate of zinc. In babies and young children an attack of *bronchitis* often causes digestive disorders, by reason of the mucus *coughed up* from the lungs being at once swallowed instead of spit out of the mouth. In these cases the stomach may be relieved and the state of the lungs improved by the use of an emetic dose of syrup of ipecac, 2 to 3 drachms (8.0–12.0). Often if the dose be not large enough to produce emesis it will purge the child and remove the mucus by the bowel.

In obstinate *vomiting* small doses of ipecac will act as a most successful cure, provided that the vomiting is due not to inflammation and excitement, but to depression. The irritant effect of the ipecac stimulates the depressed stomach up to a normal tone. The proper dose of ipecac for this purpose is ¼ to ½ a grain (0.016–0.03) or less every half-hour until five or six doses are taken.

In some cases of the *vomiting of pregnancy* it is very useful, in others it utterly fails. 1 drop of the wine or ⅙ to ¼ grain of the powdered ipecac, repeated for six or seven doses, is all that should be used. In vomiting with *flatulence* either ipecac or nux vomica is of service. In the *morning vomiting of drunkards* ipecac is of service, but it is not so good a remedy as are small amounts of arsenic or hydrochloric acid.

Ipecac is also said to possess marked oxytocic properties, similar to quinine, when given in small doses, 10 to 15 drops (0.65–1.0), of the wine every two or three hours.

In true acute *dysentery* ipecac is the best remedy we possess. When the passages are large and bloody and the disease is malignant, as it occurs in the tropics, ipecac should be given in the following manner: The powdered ipecac is to be administered in the dose of 60 grains (4.0) at once to produce vomiting. After vomiting has taken place small doses of 3 grains (0.2) are to be given every hour, and continued until a profuse black stool is passed. The passage of this stool is a most favorable prognostic sign, and its non-appearance is equally significant of danger. Vomiting is to be controlled with opium, and stimulants are to be freely used to avoid great depression.

In *choleraic diarrhœas* and *cholera morbus* ipecac is often of great service in the dose of 3 grains (0.2) every two hours. No less a person than the great Trousseau asserted that ipecac was a *hæmostatic*, and it is said to be a most effective remedy in *hæmoptysis* in small doses.

As an *expectorant* ipecac is to be used in the early stages of *bronchitis*, to act as a sedative to the inflamed mucous membrane and to promote secretion. Under these circumstances it is best combined with citrate of potassium. (See Bronchitis).

Ringer and Murrell have found that inhaling ipecac spray is very useful in *chronic winter cough* or *bronchitis*, particularly when there is present shortness of breath. The pure wine may be used in a spray apparatus or be diluted one-half with water. While the throat may seem temporarily worse, the shortness of breath rapidly decreases and a great improvement takes place in the cough. In order to prevent the wine which collects in the mouth from being swallowed, and nausea and vomiting thereby induced, the patient should be directed to rinse his mouth thoroughly every few minutes. The inhalation should not last at first over three or four minutes, and, until it is known how well the patient will bear the application, the wine should be diluted twice or thrice with water and alcohol, equal parts.

It is stated that powdered ipecac made into a paste and smeared on the skin will greatly relieve the pain and swelling produced by the *stings of bees.*

Administration.—The syrup (*Syrupus Ipecacuanhæ, U. S.*) is given in the dose of $\frac{1}{2}$ to 1 drachm (2.0–4.0) as an expectorant, or in the same dose as an emetic to an infant. The wine (*Vinum Ipecacuanhæ, B. P.*) is given in the same dose as the syrup, and the fluid extract (*Extractum Ipecacuanhæ Fluidum, U. S.*) in the dose of 30 drops (2.0) as an emetic to an adult. The troches (*Trochisci Ipecacuanhæ, U. S.* and *B. P.*) contain $\frac{1}{4}$ of a grain (0.016) each. *Trochisci Morphinæ et Ipecacuanhæ, U. S.* and *B. P.*, each of which contain $\frac{1}{36}$ of a grain (0.002) of morphine and $\frac{1}{12}$ of a grain (0.006) of ipecac, are used in sore throat, dissolved in the mouth. Dover's powder (*Pulvis Ipecacuanhæ et Opii, U. S.; Pulvis Ipecacuanhæ Compositus, B. P.*) is given in the dose of 5 to 15 grains (0.35–1.0) It contains 1 grain (0.05) of opium, 1 grain (0.05) of ipecac, and 8 grains (0.5) of sugar of milk. (See Opium.)

Emetine may be given in the dose of $\frac{1}{12}$ to $\frac{1}{6}$ grain (0.006–0.012) as an emetic, but is very rarely so employed.

The British preparations are the pill of ipecac and squill (*Pilula Ipecacuanhæ cum Scilla, B. P.*) which is given in the dose of 5 to 10 grains (0.35–0.65) and the vinegar of ipecac (*Acetum Ipecacuanhæ, B. P.*), which is given in the dose of 5 to 30 drops (0.3–2.6) as expectorants.

IRON.

Iron (*Ferrum, U. S.* and *B. P.*) is a metal which is used both as a medicine and a food—a food because it forms part of the body when taken into the organism and is used by the system in the making of blood. The number of its official salts and compounds is far in excess of the needs of practical physicians, and half the preparations are rarely, if ever, used.

Physiological Action.—Iron has little or no effect upon the system when given in a single dose, but repeated doses cause an increase in the number of red blood-corpuscles, and plethora, or an increase in the quantity and quality of the blood. Much discussion has arisen as to whether iron when given as a drug in the form of one of the inorganic salts is absorbed. One theory has been that only the organic iron of the food is absorbed, and that metallic iron when given freely allows this absorption to go on both by stimulating the bowel and by entering into combination with the sulphuretted hydrogen in the intestine, thus permitting the organic iron to escape into the system. That both forms of iron are absorbed and eliminated is now certain. (For a discussion of some of these views see article on Anæmia.) If, however, iron is given in excessive doses, much of it remains unabsorbed, is changed into the sulphide of iron in the bowels, and escapes with the fæces. Careful studies have shown that the iron, when once absorbed, escapes from the body very slowly, and that its pathway of escape is not by the bile or in the urine, but by the walls of the intestine which excrete it, so that it may be recovered from the fæces. It has been asserted that it is never released from the body, but this is untrue. Whether it acts as a stimulant to blood-manufacture or simply supplies the glands with blood-making material we do not know, but the latter is probably the correct view. Iron causes oxidation to go on more rapidly by reason of its peculiar power of converting oxygen into ozone, and in this manner acts as a stimulant to nutrition and bodily activity.

The preparations of iron consist in the soluble and insoluble salts or forms. Of these the insoluble are better than the soluble, because nearly all the soluble salts of iron are precipitated by the gastric juice and have to be slowly redissolved. Nearly all iron preparations are capable of acting as more or less poweful astringents, and so are apt to cause constipation and to disorder digestion if given in large doses. The most astringent of all of these preparations are Monsel's salt (the *Ferri Subsulphas*, *U. S.*, *B. P.*) and the sulphate (*Ferri Sulphas*, *U. S.* and *B. P.*) Closely following these in astringency are the ammonio-ferric alum, (*Ferri et Ammonii Sulphas*, *U. S.*) and the chloride of iron (*Ferri Chloridum*). The least astringent preparations are Quevenne's iron, or iron by hydrogen (*Ferrum Redactum*, *U. S.* and *B. P.*), and carbonate of iron (*Ferri Carbonas Saccharatus*, *U. S.* and *B. P.*), and Basham's Mixture (*Liquor Ferri et Ammonii Acetatis*, *U. S.*), and the citrates, tartrates, and the lactate and phosphate of iron.

Therapeutics.—The chief indications for the administration of iron are those forms of *anæmia* (see Anæmia) characterized by a decrease in the normal quantity of hæmoglobin in the blood as determined by the hæmoglobinometer, as, for example, chlorosis, and its chief contraindication is plethora. When used in small dose (¼ to ½ grain—0.016–0.03), it is quite as efficacious as in large amounts, and less apt to disorder the stomach, but the doses given in this article are the classical ones usually prescribed by physicians. In some cases of anæmia of a semi-pernicious type large doses of iron are really needed, probably because the system is deranged in such a manner that an excessive loss or elimination of iron is constantly present. Large doses compensate for this leakage and afford the quantity needed for physiological purposes. It should not be used as a tonic unless some direct indication for its employment is present, and no drug is more abused in this respect than iron. As every preparation possesses some peculiarity, the use of each will be considered separately.

Ammonio-ferric Alum.

Ammonio-ferric Alum (*Ferri et Ammonii Sulphas*, *U. S.*) is often given in cases in *atonic leucorrhœa* associated with chlorotic tendencies in the dose of 2 to 5 grains (0.1–0.35). It is quite astringent, and should not be given in cases of gastric irritability, as it is not suited to such a condition.

Aromatic Mixture of Iron.

The Aromatic Mixture of Iron (*Mistura Ferri Aromatica, B. P.*) contains so little iron that it should not be administered in cases where a very marked chalybeate influence is desired; it is, however, a useful tonic for cases of debility and slight *anæmia* following long illnesses, given in the dose of 1 to 2 fluidounces (32.0–64.0) after meals. Aromatic mixture of iron contains cinchona-bark, calumba, cloves, iron, compound tincture of cardamoms, tincture of orange-peel, and peppermint-water.

Arsenate of Iron.

Arsenate of Iron (*Ferri Arsenas, B. P.*) is used in the dose of $\frac{1}{16}$ to $\frac{1}{12}$ grain in anæmic subjects who are suffering from the dry, scaly forms of skin disease which indicate the use of arsenic. (See Arsenic.) It is also of value in the anæmia of chronic diarrhœa, as both iron and arsenic are useful, not only for the anæmia, but for the control of the intestinal disorder.

Basham's Mixture.

Under the name of Basham's Mixture (*Liquor Ferri et Ammonii Acetatis, U. S.*) a very useful and elegant preparation of iron is employed. It is particularly useful in the *anæmia of Bright's disease*, and it acts as a diuretic and diaphoretic.. It is made up as follows:

Tincture of chloride of iron	2 parts.
Dilute acetic acid	3 "
Spirit of Mindererus	20 "
Elixir of orange	10 "
Syrup	15 "
Water	50 "

The dose is from 1 to 8 drachms (4.0–32.0), well diluted.

Bromide of Iron.

Bromide of Iron (*Ferri Bromidum*) is said by DaCosta to be useful in *anæmia*, when this state is associated with *chorea*, in the dose of 5 to 20 grains (0.35–1.3) given in syrup. In other nervous diseases accompanied by anæmia and insomnia the syrup of the bromide of iron (*Syrupus Ferri Bromidi*) is useful in the dose of ½ to 1 fluiddrachm (2.0–4.0), but its sedative properties are not sufficiently marked to render it of much value in overcoming true insomnia unless it is fortified by one of the other bromides.

Carbonate of Iron.

The Carbonate of Iron (*Ferri Carbonas Saccharatus, U. S.* and *B. P.*) is very slightly astringent, and may be used in pill form under the name of *Pilulæ Ferri Carbonatis, U. S.* and *B. P.*, sometimes called "Blaud's pill," or in Griffith's pill, which also contains myrrh.

The dose is about 3 grains (0.15), and this preparation of iron is largely used for the treatment of *amenorrhœa* dependent upon anæmia. Under the name of *Mistura Ferri Composita, U. S.*, or Griffith's mixture, and *B. P.*, we have a liquid preparation used for the same purposes as the pills just named, in the dose of 1 to 2 tablespoonfuls (16.0–32.0). *Massa Ferri Carbonatis, U. S.*, sometimes called Vallet's mass, is given in pills in the dose of from 1 to 10 grains (0.05–0.65).

Chloride of Iron.

Tincture of the Chloride of Iron (*Tinctura Ferri Chloridi, U. S.*), often called Tincture of the Muriate of Iron, is one of the best and most useful preparations of iron that we have. It is the most diuretic preparation of iron. This diuretic effect does not depend upon the presence of a muriatic ether, as has heretofore been taught, since hydrochloric ether is not present, and is hard to prepare except there is an excess of chlorine present. According to some researches of Dr. S. Weir Mitchell, the only ether present is nitrous ether, and this is devoid of power and in small quantity. As chloride of iron itself is diuretic, it is probably upon this that the diuresis produced by it depends. The dose of the chloride of iron (*Ferri Chloridum, U. S.*) is 1 to 3 grains (0.06–0.18). Tincture of the chloride of iron is considered a specific in *erysipelas*, and should be given in very full dose and frequently repeated if it is to be of any service. (See Erysipelas.) 10 drops (0.65), well diluted, every hour is not too much if the stomach of the patient does not rebel. In *chronic Bright's disease* it is of value and decreases the albuminuria. In *anæmia* it is useful, and owing to its acid is a doubly effective tonic. In cases of slight anæmia in which very great arterial pressure exists Dr. Mitchell uses a purely milk diet, and an ounce of an old tincture of iron in the twenty-four hours. While he recognizes the fact that iron preparations are generally supposed to raise blood-pressure, he asserts that in this instance the blood-pressure is lowered. The dose of *Liquor Ferri Chloridi, U. S.*, is 4 to 10 drops (0.2–0.65). It is rarely used internally, but chiefly as an astringent of great power. *Liquor Ferri Chloridi* is identical with *Liquor Ferri Perchloridi, B. P. Tinctura Ferri Perchloridi, B. P.*, is used internally in the dose of 10 to 20 minims (0.65–1.3).

As a local application tincture of the chloride of iron is useful in *diphtheria* and *membranous croup*, and even in *tonsillitis*. In each of these maladies large doses of the tincture internally, with counter-irritation over the neck, are most useful. When used internally it should be well diluted with water and taken through a glass tube to protect the teeth. The strong solution of perchloride of iron (*Liquor Ferri Perchloridi Fortior, B. P.*) is a powerful styptic.

Citrates and Tartrates of Iron.

The four citrates of iron are soluble in water and very useful for this reason, because they are readily added to liquid prescriptions, and they are also of value because they are very slightly irritant and astringent and do not disorder the alimentary canal. *Ferri Citras, U. S.*, and *Ferri et Ammonii Citras, U. S.* and *B. P.*, occur in garnet-red scales and are given in the dose of 5 grains (0.35). The solution of the citrate of iron (*Liquor Ferri Citratis, U. S.*) is given in the dose of 10 minims (0.65). The *Ferri et Quininæ Citras, B. P.*, and the *Ferri et Strychninæ Citras, U. S.*, and *B. P.*, are given in the dose of 5 to 15 grains (0.35–1.0) and 1 to 3 grains (0.05–0.15), respectively. The new official *Ferri et Quininæ Citras Solubilis, U. S.*, is given in the dose of 1 to 2 grains (0.05–0.10).

Besides these citrates there are three tartrates—(*Ferri et Ammonii Tartras, U. S.*, and *Ferri et Potassii Tartras, U. S.*, and *Ferrum Tartaratum, B. P.*, all given in the dose of 5 grains (0.35).

Dialyzed Iron.

Dialyzed iron (*Ferrum Dialysatum*) is a very feeble preparation of iron, lacking in astringency, easily precipitated from the solution in which it occurs, but largely used in *anæmia* by some practitioners. The dose is 10 to 20 drops (0.35–1.3) in water three times a day. Sometimes river-water, if it contains much inorganic or organic matter, will precipitate it. Owing to the instability of dialyzed iron, it may be used without any further preparation as an antidote to arsenic. *Liquor Ferri Dialysati, B. P.*, is given in the dose of 10 to 30 minims (0.65–2.0).

Hydrated Sesquioxide of Iron.

Hydrated Sesquioxide of Iron (*Ferri Oxidum Hydratum, U. S.*) is the *antidote to arsenic*, but to be efficacious it must be freshly prepared. It is to be made by precipitating any liquid preparation of iron by the addition of an alkali, such as ammonia, or by the addition of magnesia. The resulting precipitate is the antidote, and the supernatant liquid is to be poured off. If ammonia is used, the precipitate must be washed with water several times to get rid of the alkali, which will render the antidote too irritant to be swallowed if it is allowed to remain with the precipitate. Magnesia is an antidote in itself, and should be preferred under all circumstances. The antidote should be given in excess, and as much as a pint of the iron solution should be precipitated. The magnesia should be freely added, as too much of it cannot be given. The official antidote to arsenic is *Ferri Oxidum Hydratum cum Magnesia, U. S.* In the Prussian Pharmacopœia this is known as the *Antidotum Arsenici.* (See Arsenic, Poisoning by, for official method of preparing antidote.)

Iodide of Iron.

The Syrup of the Iodide of Iron (*Syrupus Ferri Iodidi, U. S.* and *B. P.*) is a transparent liquid of a sweet, iron-like taste. It should contain no free iodine, and if it strikes a blue color with starch should be discarded. It is largely used in *anœmia* associated with *scrofulosis* and *struma*, and is useful in the *eczema* of young children when this is dependent upon lack of vitality or anæmia. The dose to a child of two years is 2 to 3 drops (0.1–0.15), well diluted, and to an adult 30 to 40 drops (2.0–2.65) in water, to be taken through a glass tube to protect the teeth.

The saccharated iodide of iron (*Ferri Iodidum Saccharatum, U. S.*) is used in place of the syrup in the dose of 2 to 5 grains (0.1–0.3). The official pills (*Pilula Ferri Iodidi, U. S.* and *B. P.*) each contain $\frac{1}{6}$ of a grain (0.01) of reduced iron and $\frac{1}{8}$ of a grain (0.075) of iodine, and are given in the dose of one to three pills.

Lactate of Iron.

The Lactate of Iron (*Ferri Lactas, U. S.*) is soluble in 48 parts of water, and is given in the dose of 5 grains (0.35). It is used for the same purposes as the other preparations of iron. Lactate of iron is one of the ingredients of *Syrupus Hypophosphitum cum Ferro, U. S.*, the dose of which is $\frac{1}{2}$ to 1 fluidrachm (2.0–4.0).

Ferri Subsulphas, or Monsel's Salt.

Monsel's Solution (*Liquor Ferri Subsulphatis, U. S.*), sometimes wrongly called the Solution of the Persulphate of Iron, is one of the most powerful styptics or hæmostatics that we have. It is never to be employed where a hemorrhage is to be attacked through the circulation, but only when the solution can come in direct contact with the bleeding spot. The objection to its use is the hard, black, and dirty clot which it forms on coming in contact with the blood. In *hœmoptysis* Monsel's solution should be used in fine spray consisting of from 10 to 60 drops (0.65–4.0) to the ounce of distilled water. In *uterine hemorrhage* from any cause the dilution may be half-and-half, or if the *hemorrhage be from a polypus* or the cervix uteri, the pure solution should be used, locally applied. In *nose-bleed* Monsel's solution may be employed diluted one-half or pure, but its use is not to be commended, because of the hard, black clot which is formed and the uncomfortable sensations and pain produced in the nasal chambers. Plugging the nostrils, and if need be the posterior nares, with pledgets of cotton is generally sufficiently efficacious.

For the *intestinal hemorrhage* occurring during or after typhoid fever Monsel's solution has been given, but ought not to be so employed, as it is decomposed in the stomach before it reaches the intestine. In its stead Monsel's salt (*Ferri Subsulphas, U. S.*) should be given in pills of 3 grains (0.15) each, the pills being made hard enough to escape into the intestine before the stomach breaks them down. One, two, or three pills may be given and repeated in an hour in pressing cases. *Hœmatemesis* due to bleeding in the stomach may be treated by 3-drop (0.15) doses of the solution in a little water. It must be remembered, however, that the drug is irritating.

In *tonsillitis* and *pharyngitis* a most efficient application is pure

Monsel's solution applied by means of a pledget of cotton or camel's-hair brush, or equal parts of the solution and glycerin may be used. This application is often as painful as it is efficient. In *diphtheria* this method of treatment is often of great service.

The antidote to Monsel's solution is common soap.

Oxalate of Iron.

Oxalate of Iron (*Ferri Oxalas*) is given in the dose of 2 to 3 grains (0.1–0.15). It possesses no advantages peculiar to itself.

Phosphates of Iron.

There are two phosphates of iron—*Ferri Phosphas Solubilis, U. S.* and *B. P.*, and *Ferri Pyrophosphas Solubilis, U. S.* Phosphate of iron itself is very insoluble and is rarely used. The official forms are, however, quite soluble, and useful in the dose of 2 to 5 grains (0.1–0.35). *Syrupus Ferri Phosphatus, B. P.*, is given in the dose of 1 fluidrachm (4.0). Phosphate of iron is one of the ingredients of the syrup of iron, quinine, and strychnine (*Syrupus Ferri, Quininæ et Strychninæ Phosphatum, U. S.*), which is given in the dose of 1 fluidrachm (4.0).

Reduced Iron.

Quevenne's Iron (*Ferrum Reductum, U. S.* and *B. P.*) is an iron-gray or reddish powder which is frequently adulterated with lampblack. If it is pure it should burn in sparks when dropped into a flame, but if lampblack is present this will not occur. It should also yield no sulphuretted hydrogen on adding sulphuric acid to it. It is tasteless, and may be given to children for this reason in pills or gum-drops, or placed inside of small chocolate creams, or in the form of troches (*Trochisci Ferri Redacti, B. P.*), each lozenge containing 1 grain (0.05) of the reduced iron. It is used solely in anæmia, and is one of the least astringent of the iron preparations.

Sulphate of Iron.

Sulphate of Iron (*Ferri Sulphas, U. S.* and *B. P.*) is used internally in the dose of 5 grains (0.35) in pill form in *chronic diarrhœa.* Externally, in a solution of the strength of 5 to 25 grains to the ounce (0.35–1.65 : 32.0), it is used as an astringent lotion. Two other forms of the sulphate are also employed—namely, the dried (*Ferri Sulphas Exsiccatus, U. S.* and *B. P.*) and the granulated (*Ferri Sulphas Granulatus, U. S.* and *B. P.*), each of which is given in the dose of 3 grains (0.18).

Valerianate of Iron.

Valerianate of Iron (*Ferri Valerianas, U. S.*) is sometimes useful in *hysteria with anæmia*, given in the dose of 1 grain (0.06) or more.

Wines of Iron.

The Bitter Wine of Iron (*Vinum Ferri Amarum, U. S.*) is useful as a bitter tonic in *anæmia* in both children and adults, and may be advantageously accompanied with cod-liver oil. It is given in a dose of 1 to 2 fluidrachms (4.0–8.0) or more. This wine is composed of soluble citrate of iron and quinine, tincture of sweet orange-peel, syrup, and stronger white wine.

Wine of the Citrate of Iron, or *Vinum Ferri Citratis, U. S.* and *B. P.*, is composed of the citrate of iron and ammonium, tincture of sweet orange-peel, syrup, and stronger white wine. The dose is identical with that of the bitter wine, and it is used for the same purposes.

Hydrated Peroxide of Iron (*Ferri Peroxidum Hydratum, B. P.*) is used in the dose of 5 to 30 grains (0.35–2.0). From the last preparation iron plaster (*Emplastrum Ferri, B. P.*) is made. The plaster of iron official in the *U. S.* is prepared from the hydrated oxide of iron.

The following preparations of iron are also official: *Liquor Ferri Acetatis, U. S.*, dose 15 minims to 1 fluidrachm (1.0–4.0), and *Liquor Ferri Acetatis Fortior, B. P.*, dose 1 to 8 minims (0.05–0.6).

Untoward Effects of Iron.—Iron is apt to cause gastric distress and frontal headache in persons who are susceptible to its use. Even one dose will cause this trouble in some persons. In many instances the frontal headache will be found to be due to the constipation which has been brought on by the iron, and will be relieved if mild laxative or purges are used. The state of the bowels should always be inquired into when iron is being used, and laxatives given whenever constipation is present and iron is being administered. In rheumatic and gouty persons frontal headaches are a common symptom when iron is given, and purgatives will not generally give relief. Garrod and Haig have shown that iron decreases the elimination of uric acid, which may account for the production of headache in the case of rheumatic patients under its influence. Sometimes salts of iron produce vesical irritation and a constant desire to urinate, causing mucus to form in abnormal amount in the bladder. In children its use may result in nocturnal incontinence of urine.

JALAP.

Jalap (*Jalapa, U. S.* and *B. P.*) is the root of *Ipomœa Jalapa*, a native of Mexico. It contains two resins, jalapin and convolvulin, neither of which is used in medicine by itself, though both of them enter into the Resin of Jalap of the *U. S. P.* In overdose jalap or its resin causes vomiting and purging, with gastro-enteritis.

Therapeutics.—Jalap is used in medicine as a hydragogue purge to relieve *dropsy* of any origin. It may be used to deplete in cases of *general plethora* with *cerebral congestion*, and owing to its tastelessness is a useful active cathartic in children if given in the proper dose —namely, 1 to 2 grains (0.05–0.10) in ½ an ounce of syrup of rhubarb.

Combined with calomel, it is preferred to all other purges by some practitioners, particularly if the liver is torpid.

Administration.—Jalap may be given in the form of the compound powder (*Pulvis Jalapæ Compositus*, *U. S.* and *B. P.*), dose 15 to 40 grains (1.0–2.65), which is composed of 35 parts of jalap and 65 parts of bitartrate of potassium; and the resin (*Resina Jalapæ*, *U. S.* and *B. P.*), dose for an adult 2 to 4 grains (0.1–0.2). Owing to the small size of the dose of the resin and its lack of taste, this preparation is to be preferred for children in the dose of ¼ to ½ a grain (0.016–0.03). The tincture (*Tinctura Jalapæ*, *B. P.*) is given in the dose of ½ to 1 fluidrachm (2.0–4.0); the extract (*Extractum Jalapæ*, *U. S.* and *B. P.*) is used in the dose of 5 to 15 grains (0.35–1.0).

JEQUIRITY.

This is a plant known as *Abrus precatorius*, the seeds of which are poisonous when applied to a wound. An active principle, abrin, is composed of paraglobulin and α-phytalbumose, which closely resemble snake-venom in their action. Jequirity is never used internally in medicine in this country. An infusion of the powdered seeds, made by adding ½ a drachm to an ounce (2.0 : 32.0) of water at 140° F. may be painted with a brush on the inside of the eyelids in cases of *chronic granular conjunctivitis*, in order to produce an acute diphtheritic inflammation which will so change the chronic process present as to permit of a cure. If an excessive action is developed, it may be controlled by hot compresses made of very dilute solutions of corrosive sublimate. The solution of the drug undergoes decomposition with great rapidity, and should be freshly prepared each time it is used, or 4 to 8 grains (0.2–0.5) of boric acid should be added to preserve it. The drug is a powerful cardiac depressant poison when injected into the circulation. Whether the seeds produce poisoning when swallowed is doubtful, some asserting that they cause gastro-enteritis, others that they are harmless. Probably much depends on the activity of digestion at the time of ingestion.

JUNIPER.

Juniperus is the fruit or berry of *Juniperus communis*, an evergreen of Northern Europe and America. It contains a volatile oil and an amorphous principle, juniperin.

Physiological Action.—Juniper acts as a gastric stimulant and tonic, as a mild diaphoretic if combined with alcohol, and as a marked stimulating, exciting diuretic. It escapes from the body by the kidneys.

Therapeutics.—Juniper is valuable as a stimulant to the genito-urinary tract whenever it is depressed or chronically diseased, as in *chronic pyelitis*, *nephritis*, and *chronic catarrh of the bladder*. In *congestion of the kidneys*, if not accompanied by active tissue-changes, it relieves these organs and does away with *albuminuria*. Used after an attack of *acute Bright's disease* when reaction has set in and the secreting epithelium of the kidney is atonic, it is of value, but care should be taken that all inflammation has passed by or it will make the patient worse. In the later stages of scarlet fever, in which the renal condition corresponds to that just described, juniper is also useful. In old persons a *sensation of weight across the lumbar region* is often quickly removed by the use of juniper if the kidneys are inactive.

Administration.—Juniper is used in the form of the compound spirit (*Spiritus Juniperi Compositus, U. S.*), composed of the oils of juniper, caraway, and fennel, combined with alcohol and water, in the dose of 1 to 4 drachms (4.0–16.0). Gin is virtually identical with the compound spirit. The infusion of juniper is made by adding an ounce (32.0) of the berries to a pint (½ a litre) of boiling water and allowing it to stand in a warm place for an hour. The entire quantity is to be taken in twenty-four hours, and the infusion is often combined with acetate of potassium or an ounce (32.0) of the bitartrate of potassium in the treatment of dropsy. The spirit (*Spiritus Juniperi, U. S.* and *B. P.*) is given in the dose of 30 minims to 1 drachm (2.0–4.0). The oil (*Oleum Juniperi, U. S.* and *B. P.*) is used in the dose of 1 to 4 minims (0.06–0.3).

KAMALA.

Kamala, U. S. and *B. P.*, or Rottlera, as it is sometimes called, is the glands and hairs from the capsules of *Mallotus philippiensis*, a plant of Abyssinia, India, and China, and Australia. In contains an active principle, rottlerin, which is not official. Given in the dose of 1 to 2 drachms (4.0–8.0), kamala acts as a drastic and as a remedy for *tape-worm*, and is sometimes used for the removal of the ascaris lumbricoides. It should be administered in syrup in which is placed some hyoscyamus to prevent griping, and the dose is to be repeated in eight hours if no effect is produced. (See Worms.)

KAOLIN.

Kaolin is a soft white powder, a decomposition-product of mineral deposits containing feldspar. It is used externally as a dusting powder in *eczema*.

KINO.

Kino is the inspissated juice of the *Pterocarpus Marsupium*, a tall tree of India. It contains kino-tannic acid, and is used as an astringent in the treatment of *serous diarrhœa*. It is official in the form of the tincture (*Tinctura Kino, U. S.* and *B. P.*), and is given in the dose of 1 fluidrachm (4.0). Kino may be used as a gargle in *sore throat* and for *relaxation of the uvula*. Under the name of *Compound Powder of Kino* (*Pulvis Kino Compositus, B. P.*) an efficient and pleasant *antidiarrhœa* powder is used. This powder is not official in the *U. S. P.* The formula for each powder is 15 grains (1.0) of powdered kino, 4 (0.2) of powdered cinnamon, and 1 (0.05) of powdered opium.

KOLA.

This drug is the nut of *Kola acuminata*, a tree growing in certain parts of Africa. The nut depends for its chief medicinal activity upon the caffeine which it contains. In addition to this alkaloid it contains some theobromine and kolatannic acid, which latter ingredient may explain the good results which have followed the use of kola in cases of diarrhœa.

Physiological Action.—The physiological action of kola is, as far as we know, nearly identical with its near relatives coffee and coca.

Therapeutics.—In cases of *feeble heart* associated with *general debility* kola often proves a valuable stimulant to the heart and general system, as well as to the kidneys. It has also been used with asserted success in *sea-sickness* and to sober drunken persons, although the latter power is to be doubted. Its use will sometimes relieve *sick and neuralgic headache.* Recently a large number of semi-proprietary articles have been introduced to the laity with the statement that they increase muscular strength. Except for their temporary stimulating power they are useless for this purpose. The drug is, however, of value in cases of *uterine inertia* during labor in the dose of 30 drops (2.0) of the fluid extract.

Administration.—Kola is not official. It may be given in the form of the fluid extract (*Extractum Kolæ Fluidum*), dose 10 to 30 minims (0.65–2.0), or in an elixir.

LANOLIN.

Lanolin, which is practically the *Adeps Lanæ Hydrosus* of the *U. S.* and *B. P.*, is a fat derived from the wool of the common sheep, and is a whitish substance of peculiar stability, very difficult of saponification, and incapable of becoming rancid. Unna states that ointments of acids, hydrogen peroxide, and other substances may be made by it. One great objection to lanolin is its stickiness, which is avoided by adding one-third of vaseline. Lanolin is supposed to possess very remarkable penetrating powers when applied to the skin in cases where much infiltration is present, particularly if it is combined with resorcin or some similar medicament. In itself it has little curative power, and is but little better than lard, suet, or any common fat as a basis for ointments. In some cases, which are rare, it will cause irritation of the skin.

LEAD.

Plumbum, or Lead, is a metal possessing more or less power over the organism according to the salts which are employed. It is not official as lead itself.

Physiological Action.—Lead, in one of its soluble salts, if applied to a mucous membrane, by reason of its astringent effect, produces a blanching which is particularly noticeable where the redness of inflammation has previously been present. It has little effect when given in a single dose, except by an indirect influence over the circulation, nervous system, or respiration. (For a description of the effects of lead in overdoses see "Poisoning," below.)

The most irritant and poisonous of the soluble salts is the nitrate, the next the subacetate, and the least poisonous of the soluble salts is the acetate.

The insoluble salts rarely cause acute poisoning, but frequently produce chronic plumbism.

Acute Poisoning.—When the acetate of lead is taken in poisonous amounts, it produces a sweet metallic taste in the mouth, followed by pain in the epigastrium and the vomiting of white, milky-looking liquids or white curds mixed with food. The white color is due to the presence of chloride of lead formed by the acid of the gastric juice.

The pain rapidly increases in severity, and diarrhœa due to gastroenteritis may be set up, or, in other cases, obstinate constipation is present. The passages are generally *black*, this color being due to the presence of the sulphide of lead. At the same time the pulse becomes rapid, tense, and cord-like, but after a time weak and compressible. The face is anxious and pale or livid. The thirst is excessive, and cramps in the calves of the legs or muscular twitchings may ensue. It is said that the characteristic blue line on the gums may occur in acute poisoning, but this is rarely if ever seen. If coma comes on in the course of acute lead poisoning, death is almost certain.

The treatment consists in the use of the chemical antidote, a soluble sulphate, in large quantity, in the administration of emetics, and the use of the stomach-pump if the vomiting produced by the drug is not sufficient to rid the stomach of all the poison. The best soluble sulphates to employ are Epsom and Glauber salts, because they are always at hand, are readily soluble, and, in excess, act as purges which will wash out the intestinal canal. Hot applications should be applied to the belly and feet, and the pain and irritation which are present should be relieved by opium.

Chronic Poisoning.—Chronic lead poisoning is rarely produced by the soluble salts of lead, nearly always being due to the insoluble salts. The symptoms of chronic lead poisoning, or plumbism, are as various as it is possible to find variety in the signs of disease of every kind. There is no train of symptoms which may not occur, and the occurrence of rare, anomalous symptoms in a given case should at once bring to the mind of the physician the thought of lead poisoning or syphilis. Chronic poisoning occurs in painters, manufacturers of lead salts, and every one who is largely thrown in contact with the metal in the arts. It occurs from the use of hair-dyes containing the acetate of lead, from drinking water which has passed through new lead pipe, and even from the biting of silk threads loaded with lead to increase their weight. Chromate of lead has been used to color sponge-cake when eggs were thought too dear, and has killed many persons. Millers who have filled the holes in grindstones with lead have caused widespread epidemics of what has been called "dry cholera," and many persons have suffered from lead poisoning from eating apple-butter kept in jars glazed with lead.

One of the most prominent, but by no means the most constant, symptoms of chronic plumbism is bilateral wrist-drop, due to palsy of the extensor muscles of the forearm. The short extensor of the thumb generally escapes the drug's influence, as does also the supinator longus. Sometimes internal squint arises from paralysis of the external rectus muscles by the lead. Another very common symptom is colic centering around the umbilicus and radiating through the belly and loins. Obstinate constipation often accompanies these symptoms, and the fæces, when passed, are white and clay-colored, owing to a deficient secretion of bile.

During an attack of lead colic the arterial tension is increased very markedly, the tongue is coated and whitish, and the bowels are obstinately confined.

If these early warnings are disregarded and the exposure to the lead is continued, cerebral symptoms may come on, the result of *encephalopathia saturnina*, or saturnine cerebritis. Saturnine epilepsy is not very rare. If convulsions come on, death generally ensues. The convulsions in some cases are not due to a cerebral effect of the lead, but to uræmia due to the renal changes which it has caused.

Renal disease is very commonly produced by lead, and it is not uncommon for chronic contracted kidney to be found at the autopsy of a sufferer from chronic lead poisoning. If a patient with chronic lead poisoning have a urine with a persistent low specific gravity, the prognosis is grave, as evidencing advanced kidney involvement.

Asthma due to the inhalation of lead-dust is sometimes met with.

The *most important confirmatory evidence of chronic lead poisoning is a blue line on the gums just where they join the teeth.* Its absence is not a negative sign, however, as poisoned persons cleanly in respect to their mouths often do not have it. Marked cachexia or anæmia is commonly seen in chronic lead poisoning.

After prolonged lead-poisoning the nerve-trunks are found atrophied, and finally changed into fibrous cords. Anterior poliomyelitis may be present, but true locomotor ataxia is rarely caused. If ataxic symptoms exist, they are most probably dependent on pseudo-tabes produced by a plumbic multiple neuritis, and can be separated from true tabes dorsalis by the absence of several of the important true tabetic symptoms—such as slow onset, the Argyll-Robertson pupil, etc. —while the presence of marked wasting and loss of power, with tenderness over the nerve-trunks, points to neuritis.

In some cases trophic changes in the joints ensue, and plumbic gout is not rarely seen, or even lead arthralgia, with deposits of urates in the joints. This condition is due to the fact, pointed out by Garrod and Haig, that lead forms insoluble salts with uric acid.

Lead escapes from the body in the urine, the fæces, and all the secretions. It is chiefly eliminated by the liver in the bile.

Treatment of Chronic Poisoning.—The treatment consists in three classes of remedial measures: 1st, the removal of the cause; 2d, the removal of the poison in the body; and, 3d, the treatment of the lesions produced by the poison.

In lead colic hepatic purges, such as jalap and calomel, combined with opium to prevent pain, are indicated, and alum and opium or morphine are said to be almost specifics, the alum in 2-grain doses, the others in full amounts. In many cases purges fail to move the bowels of a person suffering from chronic lead poisoning, and succeed only when morphine is given to overcome the intestinal inhibition produced by the irritation caused by the lead.

In the cerebral inflammation of lead-poisoning a blister to the back of the neck, revulsives, and a pilocarpine sweat may be resorted to.

To aid in the elimination of the lead, iodide of potassium, which forms double soluble salts in the tissues with the metal, is to be used, 10 to 20 grains (0.65–1.3) three times a day.

If progressive paralysis is present, Wood insists on the use of large doses of strychnine at the same time that the iodide is given. The strychnine should not, of course, be given in the same mixture as the iodide, as it is incompatible.

Electricity should be used as a remedy to restore lost function. If the faradic current makes the muscles contract, it should be employed, and, if not, the galvanic current should be used. Curiously enough, partial voluntary power sometimes returns before the muscles will react at all to electricity.

It is said that baths of sulphuret of potassium do good in chronic plumbism, 5 or 6 ounces (160.0) of the salt to each bath, which is to be given in a wooden tub. The patient should afterwards be well soaped, then thoroughly rinsed off, and rubbed down with a rough towel.

As the salts of lead are used for different purposes, the therapeutics of each one will be taken up separately.

Acetate of Lead.

Acetate of Lead (*Plumbi Acetas*, *U. S.* and *B. P.*), or Sugar of Lead, has a sweet, astringent taste, and is soluble in water, although the solution formed is slightly milky in appearance.

Therapeutics.—Acetate of lead may be used, and is largely employed, in the following pill in the treatment of *serous diarrhœa:*

℞.—Plumbi acetat. . . . . gr. xl (2.65).
Pulv. opii . . . . gr. x (0.65).
Camphoræ . . . . gr. xl (2.65).—M.
Ft. in pil. No. xx.
S.—One every four hours.

This pill may also be given in cases of *dysentery*.

The acetate of lead in proportion of 1–8 grains (0.06–0.5) to the ounce of water may be used as an injection for gonorrhœa.

Lead acetate is also a useful application for the *dermatitis* produced by poison ivy, as this drug precipitates the sticky, non-volatile oil of Rhus toxicodendron, recently studied by Pfaff. The acetate of lead should be dissolved in alcohol in the proportion of half a grain to the ounce (0.03–30.0) and used as a wash. After this the inflamed parts should be treated by cooling applications, but ointments are not to be used, as they dissolve the poisonous oil and spread the irritation.

Administration.—The *B. P.* recognizes the following preparations of lead acetate: *Pilula Plumbi cum Opio*, dose 3 to 5 grains (0.1–0.3); *Suppositoria Plumbi Composita*, each suppository containing 1 grain (0.06) of opium to 3 grains (0.18) of lead acetate; and an ointment (*Unguentum Plumbi Acetatis*).

Carbonate of Lead.

Carbonate of Lead (*Plumbi Carbonas*, *U. S.* and *B. P.*), or White Lead, is insoluble. and is used as a coating or dressing for *burns*, *scalds*, or *ulcers* when rubbed up with linseed or other oil, or in the form of the ointment (*Unguentum Plumbi Carbonatis*, *U. S.* and *B. P.*). If a wide surface is covered with this ointment, it may cause lead poisoning by absorption.

Carbonate of lead may be used in the treatment of *sunburn* in the following prescription:

℞.—Plumbi carbonat.	ʒj (4.0).
Pulv. amyli	ʒj (4.0).
Unguent. aquæ rosæ	℥j (32.0).
Olei olivæ	fʒij (8.0).—M.

S.—Apply to the inflamed skin.

Iodide of Lead.

Iodide of Lead (*Plumbi Iodidum*, *U. S.* and *B. P.*) is occasionally employed in medicine; the dose is ½ to 2 grains (0.03–0.1). *Emplastrum Plumbi Iodidi*, *P. B.*, and *Unguentum Plumbi Iodidi*, *U. S.* and *B. P.*, are useful as external astringent and alterative applications, but are rarely used.

Liquor Plumbi Subacetatis.

Liquor Plumbi Subacetatis, *U. S.* and *B. P.*, or Goulard's Extract, is a colorless liquid, much used externally, when diluted with laudanum, for *sprains*, *bruises*, and local inflammations, under the name of "lead-water and laudanum." "L. and L.," as it is often called in the hospitals, is a useful application in the *dermatitis* produced by poison ivy. The proportion should be 4 parts of the pure lead-water, diluted with 16 parts of water, to 1 of laudanum, but this is varied as the inflammation or pain is the more severe. The official liquor is also official in a dilute solution (*Liquor Plumbi Subacetatis Dilutus*, *U. S.* and *B. P.*), and as such is too weak for ordinary use, although it is commonly employed. The strong solution should be used in the strength of from 1 to 4 ounces (32.0–128.0) to the pint (500 cc.) of water. This solution should never be employed if the skin is broken, as absorption may occur, and, what is more important still, the drug prevents healing by constringing and whitening the edges of the wound.

If some bread-crumbs be saturated with the solution just named and applied to an inflamed finger, a *felon* can often be aborted in the early stages. The official dilute solution is useful as a lotion in *eczema* which itches and tingles and is not dry in character. It should be applied once or twice a day, and it is well to follow the application of lead with a weak sulphur bath or alkaline wash. (See Eczema.)

Lead-water is also useful in *pruritus pudendi.* The cerate (*Ceratum Plumbi Subacetatis, U. S.*), the liniment (*Linimentum Plumbi Subacetatis*), and the glycerin (*Glycerinum Plumbi Subacetatis, B. P.*) may be used for the same purposes as the Goulard's extract.

Litharge.

Litharge (*Plumbi Oxidum, U. S.* and *B. P.*) is used for the preparation of lead plaster (*Emplastrum Plumbi, U. S.* and *B. P.*), sometimes called "Diachylon," and this is in turn employed for the manufacture of resin plaster (*Emplastrum Resinæ, U. S.* and *B. P.*). It is also used in the preparation of the solution of subacetate of lead.

Hebra recommended for *sweating of the feet* an application of equal parts of lead plaster and linseed oil, applied on linen and wrapped around the feet every third day.

Nitrate of Lead.

Nitrate of Lead (*Plumbi Nitras, U. S.* and *B. P.*) is never used internally, but as a powder, in the treatment of cases of *onychia maligna* and in the formation of Ledoyen's disinfecting solution. The latter discolors the paint in water-closets, dissolves the solder in drain-pipes, and is not a good preparation for general use.

LEPTANDRA.

The medicinal portion of *Veronica virginica* is the rhizome and rootlet, from which are made the official extract of leptandra (*Extractum Leptandræ, U. S.*) and the fluid extract (*Extractum Leptandræ Fluidum, U. S.*). The dose of the former is from 1 to 8 grains (0.06–0.5) and of the fluid extract 5 to 40 minims (0.3–2.6).

Physiological Action.—Very few experiments have been made as to the action of this remedy, and the only ones of importance are those of Rutherford and Vignal, who found that it possesses a moderate influence in increasing the flow of bile. In overdose it causes violent purging.

Therapeutics.—In the official preparations of leptandra, which are not as active as is the fresh drug, we have excellent substitutes for calomel, according to many clinicians. Those who have used leptandra also believe it to be of the greatest value in the indigestion of the [illegible] "duodenal atony." (See also Podo- [illegible] is a good method of using the drug in

[illegible] . . . . gr. xx (1.3).
[illegible] . . . . gr. xx (1.3).—M.

[illegible] -andrin we have an impure resin which is [illegible] grains (0.1–0.3). An alkaloid of doubtful [illegible] -irine.

LIPANIN.

[illegible] prepared mixture devised by von Mering [illegible] -er oil, and consists in 6 parts of oleic acid [illegible] -ive oil. The advantages possessed by it are [illegible] odor and taste and its ready emulsification [illegible] commencing dose is 1 drachm (4.0) which [illegible] drachms (16.0). This mixture has been found [illegible] wasting diseases in which cod-liver oil is em- [illegible] of von Mering its efficacy is greatly increased [illegible] lime and sodium are used at the same time in [illegible] three times a day. Iodine or one of its [illegible] given if it is desired to exert an alterative

LIQUORICE.

[illegible] *U. S.; Glycyrrhizæ Radix, B. P.*) is the [illegible] *glabra*, a plant of Southern Europe and Asia. [illegible] secretion in the mouth in the form of a solid [illegible] dissolved in water to form a vehicle for other drugs, [illegible] have a disagreeable taste. The powdered solid [illegible] and useful laxative.

The solid extract (*Extractum Glycyrrhizæ, U. S.* [illegible] in a dose anywhere from 5 to 120 grains (0.35– [illegible] (*Extractum Glycyrrhizæ Purum, U. S.*) is [illegible] as the ordinary extract. The fluid extract [illegible] *Fluidum, U. S.*) or the liquid extract (*Extrac-* [illegible] *B. P.*) is used in 1- to 2-drachm (4.0–8.0) [illegible] of Brown Mixture or "Compound Liquorice [illegible] expectorant solution is official (*Mistura* [illegible] *U. S.*), which contains as its most important [illegible] paregoric, 6 parts of wine of antimony, and [illegible] nitre. The dose of Brown Mixture is 1 to 4

[illegible] *Glycyrrhizæ Compositus, U. S.* and *B.* [illegible] powder, contains, according to the *U. S. P.*, [illegible] per cent. of liquorice, 4 per cent. of oil of [illegible] sulphur, and 50 per cent. of sugar. Ac-

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cording to the *B. P.*, it should contain 2 parts of senna, 2 of liquorice-root, 1 of fennel-fruit, 1 of sublimed sulphur, and of sugar 6 parts. The dose is 1 to 4 drachms (4.0–16.0). It is largely used as an efficient laxative after childbirth and in cases which suffer from constipation chiefly due to the inactivity consequent upon being in bed. The troches (*Trochisci Glycyrrhizæ et Opii*, *U. S.* and *B. P.*) contain $\frac{1}{20}$ grain (0.003) of opium and 2 grains (0.1) of extract of liquorice. Finally we have *Glycyrrhizinum Ammoniatum*, *U. S.*, which is the sweet principle of liquorice rendered soluble and easily tasted by the addition of ammonia. The dose of this preparation is 5 to 15 grains (0.3–1.0).

LIQUOR POTASSÆ.

Liquor Potassæ, *U. S.* and *B. P.*, is a solution of potassa containing about 5 per cent. of potassium hydrate, and is a clear, odorless liquid of caustic taste and strongly alkaline reaction. It is used in medicine as an *antacid* and for the purpose of decreasing the *acidity of the urine.*

In cases of *ingrowing toe-nail* it is often used to soften the nail prior to packing with cotton or partial evulsion. Its dose is 5 to 30 drops (0.35–2.0) well diluted with water.

LITHIUM.

Lithium is used in several forms, but its salts may be divided into two classes—those which act as lithium and those which act as the acids forming them. In the first class we have the carbonate (*Lithii Carbonas*, *U. S.* and *B. P.*), dose 2 to 10 grains (0.1–0.65), the citrate (*Lithii Citras*, *U. S.* and *B. P.*), dose 5 to 20 grains (0.3–1.3), and the effervescent citrate (*Lithii Citras Effervescens*, *U. S.*), dose 1 to 4 drachms (4.0–16.0). In the second class we find the benzoate (*Lithii Benzoas*, *U. S.*), dose 5 to 30 grains (0.3–2.0); *Lithii Bromidum*, *U. S.*, dose 10 to 40 grains (0.65–2.65), and *Lithii Salicylas*, *U. S.*, dose 10 to 30 grains (0.65–2.0).

The carbonate and citrate are used in *gout* and *rheumatoid arthritis* for the purpose of entering into combination with the uric acid in the body to form soluble urates and prevent deposits in the joints. They have been said to dissolve *calculi*, but this is untrue, though they are used when it is desired to render the urine alkaline. Haig has pointed out that although lithia forms salts with uric acid in the test-tube, in the body it has a greater affinity for the acid sodium phosphate in the blood, and practically leaves the uric acid to itself. This is an important point, since it proves that the large amount of water generally taken with lithia has more to do with relieving gout than has the lithia. The carbonate is not soluble in water, and should be given in capsule or freshly-made pill, but the citrate is soluble. The latter may be made from the former by taking 50 grains (3.3) of the carbonate, 90 grains (6.0) of crystallized citric acid, and warm distilled water 1 fluidounce (32.0). The acid should be dissolved first, and the carbonate added to the solution. The solution should then be kept hot until effervescence ceases.

In cases of *diabetes* depending upon a gouty taint remarkable results are often obtained from the use of the citrate or carbonate of lithium and arsenic. The dose should be $\frac{1}{30}$ of a grain (0.002) of arsenite of sodium and 10 grains (0.65) of the lithium salt three times a day.

It is worthy of note that in some cases citrate of lithium will disorder the stomach and produce vomiting.

Lithia-water, or the preparation of the British Pharmacopœia, *Liquor Lithiæ Effervescens*, is useful in gout in quantities of 5 to 10 ounces (160.0–320.0) at a time.

(For the use of other salts of lithium see the articles on the Bromides, Salicylic Acid, and Benzoic Acid.)

(See also article on Mineral Springs.)

LOBELIA.

Lobelia, *U. S.* and *B. P.*, is the leaves and tops of *Lobelia inflata*, a common weed of the United States. It contains an alkaloid, lobeline, and lobelic acid.

Physiological Action.—When taken in overdose lobelia causes emesis, intense prostration, a feeble pulse, pale skin, livid face, muscular relaxation, and a cold sweat. Violent purging may be present. It is said to paralyze the motor nerve-trunks, and it causes a fall of arterial pressure, followed by a rise, the latter change being due to the asphyxia which it finally produces. Ultimately it paralyzes the respiratory centre and the peripheral vagi. The treatment of the poisoning is to administer opium to stop irritation and vomiting, to give alcohol and ammonia to support the heart, and the use of external heat.

Therapeutics.—Lobelia is used chiefly as an *antiasthmatic*, and has been equally praised and condemned by eminent authorities. The reason for this lies in the fact that it is generally useless in *asthma* unless given in almost poisonous dose. Wood teaches that it should rarely if ever be used, because of its poisonous effects even in doses medicinally active, while Sydney Ringer says that the drug is erroneously thought to be dangerous. In *asthma* both of the gastric and bronchial form lobelia is undoubtedly of service. In some cases it fails as signally as it succeeds in others. If the asthma is due to or associated with cardiac disease, lobelia should never be employed. The drug should be taken in the dose of ½ a drachm (2.0) to 1 drachm (4.0) of the tincture at the first sign of an attack, or in 10-drop (0.65) doses every fifteen minutes until distinct nausea occurs or relief is obtained. If the heart is feeble, its use is contraindicated.

In *atonic constipation* with great dryness of the fæces 10 drops (0.65) of the tincture of lobelia at bed-time are often of service, particularly if it is combined with cascara sagrada. (See Cascara Sagrada.)

Administration.—Lobelia is given in the form of the tincture (*Tinc-*

tura Lobeliæ, U. S.), in the dose of 10 to 30 drops (0.65–2.0), or 1 to 2 drachms (4.0–8.0) as an emetic. The vinegar (*Acetum Lobeliæ*) is no longer official, but is given in the dose of 20 to 30 drops (1.65–2.0), and the fluid extract (*Extractum Lobeliæ Fluidum, U. S.*) in the dose of 1 to 5 drops (0.05–0.35), or as an emetic in the dose of 15 drops (1.0).

In the form of the infusion lobelia is useful as a lotion in the treatment of the *dermatitis* produced by poison ivy. The proportion used should be an ounce (32.0) to the pint (½ litre) of water.

The preparations of the *B. P.* are the *Tinctura Lobeliæ*, dose 10 minims to ½ drachm (0.65–2.0), and *Tinctura Lobeliæ Ætherea*, dose 10 to 30 minims (0.65–2.0).

LYCOPODIUM.

Lycopodium, U. S., is a pale-yellow powder derived from *Lycopodium clavatum*, a species of moss. It is used by pharmacists as a powder in which to roll pills, and by physicians and nurses to prevent the *intertrigo* or *chapping of the skin* of infants and adults.

LYSOL.

This is a preparation made by dissolving in fat and saponifying with alcohol that part of tar oil which boils between 190° and 200° C., and is a brownish, clear, oily fluid, smelling somewhat like creosote. It is used for the same antiseptic purposes as creolin (see Creolin), but possesses the advantage of forming a clear, soapy fluid when mixed with water, in which instruments can be seen. If small instruments are used, the solution is so soapy that it renders them too slippery for ready use. Those who have used lysol claim that it does not affect the skin of the operator's hands except to render it soft and flexible. Experiment shows it to be possessed of marked antiseptic power, and it is far less poisonous than carbolic acid. Used upon mucous membranes, a solution of lysol should not be stronger than 2 per cent.

MAGNESIA.

Magnesia is the oxide of magnesium, made by exposing the carbonate of magnesium to a red heat. It is used in the form of the light magnesia (*Magnesia Levis*) as a dusting powder. The troches (*Trochisci Magnesiæ*) each contain 3 grains (0.015).

Magnesia is an antidote to arsenic, and when employed to precipitate a soluble preparation of iron it forms the *Antidotum Arsenici* (*Ferri Oxidum Hydratum cum Magnesia, U. S.*).

It is important that the student should not confuse magnesia and magnesium. The first is the oxide of the second, and is sometimes called calcined magnesia or "Husband's Magnesia." Magnesia is of little value in internal medicine except as a feeble antacid. Magnesia and the carbonate of magnesium may be used interchangeably.

MAGNESIUM.

Magnesium is a metal never used as such, but always in the form of one of its salts, which are the sulphate, citrate, carbonate, and sulphite. The sulphite is a natural salt found in sea-water and in caves or in the water coming from the latter. The citrate and carbonate are derived from the sulphate. The carbonate is insoluble in water and alcohol. The others are soluble.

Magnesium Carbonate.

The Carbonate of Magnesium (*Magnesii Carbonas, U. S.*) is official in the form of the heavy and light powder (*Magnesii Carbonas Ponderosa vel Levis, B. P.*), and these two substances do not differ in respect to their effects. The light magnesium is never given internally, because of its bulk, but it is used as a dusting powder in *intertrigo,* and in the form of white cubes rubbed on the skin to prevent excessive perspiration and as a cosmetic. The heavy magnesium is used as an *antacid,* and is not, as has been thought by some, in any sense a laxative, as it possesses no such power. When the stomach or intestines contain much acid from fermentative changes, these acids may, however, unite with the magnesium and form a slightly laxative salt.

In *sick headaches* due to great *gastric acidity* carbonate of magnesium is often of service. The dose of the carbonate is from 5 to 60 grains (0.3–4.0). It should not be used constantly, as there is danger that it will accumulate in the intestines.

Liquor Magnesii Carbonatis, B. P., is given in the dose of 1 to 2 ounces (32.0–64.0) as a laxative.

Magnesium Citrate.

The Citrate of Magnesium (*Magnesii Citras*) is a much more irritating purge than the sulphate, but it is more agreeable to the taste. It is official in two forms, one of which is the solution (*Liquor Magnesii Citratis, U. S.* and *B. P.*), which is effervescent and should never be used unless freshly prepared. It is made by adding bicarbonate of potassium to a syrupy solution of the citrate of magnesium containing an excess of acid, and corking the bottle tightly, the cork being tied down with a strong cord. Care should be taken that the bottle is a strong one, as the development of large amounts of carbonic acid gas may burst it if it be weak. The dose is half to one bottle, which contains about 12 ounces (360 cc.). It is too irritating to be used where inflammation of the alimentary canal exists, but is useful in the treatment of sick and bilious headache.

The Granulated Citrate (*Magnesii Citras Effervescens, U. S.*) is more agreeable to take than the solution just named. It should be dissolved in water, about 1 to 3 drachms (15.0–45.0) of the salt being used in a small dose, and swallowed while the solution is effervescing. It must be kept in bottles tightly corked.

Magnesium Sulphate.

Sulphate of Magnesium (*Magnesii Sulphas*, *U. S.* and *B. P.*) is a white granular powder of neutral reaction, salty taste, and is soluble in water. It is the form generally known by the laity as "salts," although in some parts of the country this term also includes the sulphate of sodium.

According to the studies of Hay and others, sulphate of magnesium is a purge by reason of its abstraction of water from the intestinal blood-vessels. All strong saline solutions above the strength of 7 per 1000 abstract liquids from the tissues when brought in contact with them. On the other hand, if a saline solution be less strong than 7 per 1000, it will abstract salts from the tissues and replace them with water. The recollection of these facts readily makes clear the mode of action of magnesium sulphate. Whenever a thorough purgative action is required—that is, where depletion of the intestine or absorption of exudations is to be attained—the magnesium should be given in concentrated form, so as to make its solution of as high a percentage as possible.

Magnesium sulphate may be given by enema with the double purpose of unloading the bowels and acting as a depletant. The best mixture for this purpose seems to be that proposed by Watkins—namely, 2 ounces (64.0) of magnesium, 1 ounce (32.0) of glycerin, and 4 ounces (128.0) of water.

In cases of *dropsy* the use of concentrated solutions is particularly necessary if free watery evacuations are desired, and from 1 to 2 ounces should be given before breakfast or on an empty stomach in as little water as will dissolve the salt. (See Dropsy.) Generally it is better to give this quantity divided into small doses every fifteen minutes till it is all taken.

In *enteritis* and *peritonitis* this use of magnesium is widely recognized as a proper measure. The sulphate is not irritating, and may be given freely when inflammation exists. (See Peritonitis.) It forms a large part of most of the natural purgative waters. The *B. P.* recognizes an enema, *Enema Magnesii Sulphatis*, composed of sulphate of magnesium 1 part, olive oil 1 part, starch mucilage 15 parts.

MANGANESE.

Manganum, or Manganese, is official in the form of the black oxide (*Mangani Dioxidum*, *U. S.* and *B. P.*) and the sulphate (*Mangani Sulphas*, *U. S.*). The first of these, under the name binoxide of manganese, has been highly praised in *amenorrhœa* dependent upon functional disturbance and anæmia. The dose is 3 to 5 grains (0.15–0.3) three times a day, in pill form, and the drug should be taken for a few days before the expected or proper date for menstruation. The sulphate is rarely if ever employed, but may be tried in *malarial jaundice*. The dose is 1 to 2 grains (0.05–0.1).

MANNA.

Manna, *U. S.* and *B. P.*, is the concrete saccharine exudation of *Fraxinus Ornus*, a tree of Europe. It occurs in roundish masses

a gray-colored gum arabic.
the taste is a little bitter.
ble of the laxatives, and
ns. In children fed by the
is *obstinate constipation*, and
f the sweet variety of manna
bottle. When given to older
mbined with other more power-
se. It may be combined with
and it enters into the official
the dose of which is from 1 to 4

CARIA.

hamomile, consists in the flower-heads
an plant, possessing mild bitter tonic
dose. In larger amounts it acts as
the form of an infusion of the strength
64.0 : ½ litre) it has been largely
doses, to prevent *colic* in teething

MENTHOL.

(PEPPERMINT.)

MERCURY.

S. P., Mercury or Quicksilver, is a
color and appearance. As mercury
form of the ointment, the plaster, gray

When mercury is taken into the body in
preparations, it may cause no evidence
quent dosage the system in general begins
first evidences of this are to be found in
tenderness of the teeth when the jaws are
fetid breath, sponginess of the gums,
the slightest touch, swelling of the tongue,
d, excessive salivation, a condition some-
the use of the drug is persisted in, all
Eczema, and finally sloughs of the chin
result of the constant dribbling of saliva
fect of the drug on the tissues. The teeth
undergo necrosis, and amid a general
tion of the tissues the patient dies. The
s very thin, fluid, and poor in its corpus-
ptoms ensue on the use of mercury in
follow exposure to the drug in the pro-
arts—as, for instance, in the making of

T
tatin
It is
nexii
never
bonate
containi
being
bottle is
acid gas
which
used whe
the treatment
The Gran
less agreeable
dissolved in wat
used in each dose
must be kept in

looking-glasses—workmen are often affected by various trains of symptoms varying very widely in their course. In some cases the nervous system becomes chiefly affected. Tremors of all sorts arise, paralysis agitans is developed with its typical characteristics, and widely different changes and degenerations in the spinal cord ensue; but it is worthy of note that the ocular muscles are rarely involved in mercurial tremor, while in disseminated sclerosis nystagmus is not rare. Similarly the tremors of mercurial poisoning often affect the head and neck alone, while in paralysis agitans this is rarely the case. Chorea often comes on in chronic mercurial poisoning, and the occurrence of choreic movements in an adult should cause inquiry as to any possible exposure to mercury. In other cases brownish discoloration of the skin, resembling Addison's disease, appears. Blindness, deafness, sensory disturbances, such as hyperæsthesia and anæsthesia, are developed, and localized wasting of muscles or groups of muscles may assert itself. In still other cases the blood becomes impoverished and mercurial cachexia is developed.

It is worthy of note that children under three years are rarely salivated by the use of mercury, but this is no reason for using this drug carelessly in this class of cases, since the other changes in the organism nevertheless occur.

ABSORPTION.—The question as to the form in which mercury finds entrance into the system is one of interest and importance. According to certain writers it is changed into an albuminate, and so circulates in the blood, but, while this is probably true, it is not known to be a fact.

Some have supposed that the bichloride is held in solution as an albuminate of the oxide of mercury united with sodium chloride, but others have asserted that metallic mercury in a state of minute subdivision circulates in the blood: this point, however, cannot be considered settled, and the drug undoubtedly accumulates in all the tissues, more especially in the liver and kidneys.

ELIMINATION.—Mercury in all its forms is absorbed and eliminated by the kidneys, liver, skin, and salivary glands. No secretion of the body, even to the semen, fails to carry it out of the system, but it is to be remembered that, although these parts are actively engaged in its elimination, the drug nevertheless rapidly accumulates in the body.

Balzer and Klumpke have made a long series of observations at the Lourcine Hospital in Paris on the rapidity of the elimination of mercury by the kidneys during a treatment of long standing. While there are many methods for the estimation of mercury in organic fluids, these investigators throughout adopted that of Witz, as modified by Souchow and Michaelowsky, which permits of the easy detection of the $\frac{1}{1000}$ of a grain (0.00006) in an ounce (32.0). After a single dose of mercury the elimination of the drug is rapid, and sometimes complete in twenty-four hours, but if a continuous treatment is interrupted, its excretion continues for some time, and Kussmaul and Gorup-Besanez have found it in the liver as much as a year after its administration has been stopped. The amount of mercury that can be readily eliminated for many weeks from the kidneys when the body is saturated is about $\frac{1}{16}$ of a grain (0.004) daily.

Therapeutics.—The employment of mercury in medicine centres around four great points—viz.: 1st, its value in *syphilis* and kindred states; 2d, its use as a *purge*; 3d, its power as an *antiseptic* and *germicide*; and 4th, its action as an *antiphlogistic*: the first and fourth points are fulfilled by all the mercury salts more or less perfectly, the second only by blue mass and calomel, the third by the bichloride and biniodide of mercury.

AS AN ANTISYPHILITIC.—In *syphilis* mercury is to be given, not because the patient shows symptoms of this or that stage of the disease, but because the conditions present call for its employment. Many writers have insisted that it ought only to be employed in the secondary stages, and, while this is, as a general rule, correct, certain conditions may call for it at any time. (See Syphilis.)

Of all the preparations of mercury used in the treatment of syphilis, the protoiodide is the most popular, and deservedly so. (See article on Syphilis.)

Mercury is often administered by means of fumigations or inhalations both for the removal of local and general syphilitic disorders. The best apparatus for either purpose is one devised by Bumstead, and it is both simple and inexpensive. It consists of a sheet-iron cup so bent that the bottom of the vessel, instead of being flat, projects upward into the centre of the cup, thereby forming a raised centre with a little ditch about it. The top of this projection is flattened, and on its apex is placed the calomel which is to be sublimed. The surrounding ditch is then filled with hot water, and the cup placed over an alcohol flame, which disengages the vapor of the calomel and water.

When inhalations are used the face should be held some six or eight inches away from the cup to permit the fumes to pass through the air. Under these circumstances the quantity of calomel used should not exceed 4 or 5 grains (0.3), and the mouth should be rinsed out to prevent mercurial stomatitis unless a local action on the buccal mucous membrane is desired. Not more than eight or ten inspirations should be taken at one sitting.

If general fumigations are to be practised, the patient places the lamp and cup with 30 grains (2.0) of calomel on it under a chair, on which he sits wrapped in a heavy blanket.

We believe that the ultimate conclusion of the profession in regard to the hypodermic injection of mercurials in syphilis will certainly be identical with that governing its use of quinine in malarial fever. There can be no doubt that a certain number of instances do arise in which, by reason of severe infection, susceptibility of the patient, or inability to take mercury by the ordinary means, hypodermic injections are absolutely necessary. In the same way that we give quinine by the mouth, the rectum, and hypodermically in pernicious malarial fever, so do we give mercury by the mouth, by inunctions, by sublimation, and by the hypodermic needle in malignant syphilis. The reasons for believing that hypodermic injections of mercurials are not to be resorted to as a routine treatment of syphilis are several. In the first place, all forms of hypodermic medication possess disadvantages not possessed by the use of drugs by the mouth. There is always some danger of entering a vein, of producing an abscess, or of causing local pain. When mercurials are so employed, the danger of abscess, of pain, or of milder inflammatory manifestations is greatly increased, and the presence of an indurated spot where the hypodermic injection has been given proves that it is not the simplest form of medication in syphilis. Of the mercurial preparations which are best administered hypodermically in syphilis, the two which surpass all others are undoubtedly the bichloride of mercury, in the dose of $\frac{1}{6}$ grain, dissolved in 10 or 15 drops of distilled water, every second or third day, or gray oil (*Oleum Cinereum*), which was first introduced into medicine by Lang of Vienna. (See Gray Oil, under Mercury.)

In all cases the injection should be given slowly and deeply into some portion of the body in which the tissues are loose, as the buttock or the broad of the back, and the skin of the part where the injection is to be made should be carefully washed and sterilized by green soap and alcohol.

The intravenous injection of bichloride of mercury has been proved so dangerous as to be properly considered unjustifiable.

AS A PURGE.—The employment of mercury as a purge or laxative having a *special action on the liver* is constantly resorted to. The two preparations used are blue mass and calomel, but the latter is more active. They both cause soft or watery stools, according to the dose in which they are given, but the blue mass is rarely, if ever, used except for the production of a laxative effect.

Much discussion has arisen as to whether mercury affects the liver, and whether the peculiar greenish or brownish-yellow stools produced by it are due to the presence of bile or mercury.

If there is one point firmly fixed in the mind of the average practitioner of medicine, it is that the mild chloride of mercury increases the quantity of bile in the intestine. If such a believer is questioned as to whether this increased amount of biliary fluid is due to a true increase in secretion or simply to an increase in the flow of bile from the gall-bladder, he will either state that he is unable to answer the question or that he believes that it is an increased secretion.

Practically, the position of the profession in general in regard to the purgative influence of calomel is that the drug exercises a stimulating effect upon the biliary gland. Careful experimentation upon the lower animals by several competent observers, and careful studies made by physiological chemists, fail, however, to give us very much light upon this subject. It is held by some that calomel never acts as calomel, but is converted by the hydrochloric acid of the gastric juice into corrosive sublimate, and that this drug then stimulates the liver to increased activity.

On the other hand, the best chemical investigations show positively that the feeble acidity of the gastric juice and the temperature to which the calomel is exposed are not favorable to the conversion of a sufficient quantity of calomel into corrosive sublimate to account for any hepatic influence. Thus it was found by Rutherford and Vignal, in their well-known series of studies upon the influence of drugs upon the secretion of bile, that if 5 grains of calomel are subjected, at 100° F., for seventeen hours to the action of normal gastric juice, not more than $\frac{1}{35}$ of a grain of mercuric chloride is produced. As calomel does not remain in the human stomach for more than a night at the utmost, and generally but a very few hours, it is not likely that as much as $\frac{1}{35}$ of a grain of mercuric chloride is produced from the moderately large dose of 5 grains.

In contradiction of this, Bucheim, Winkler, and others assert that no conversion whatever takes place at the temperature of the body, and Jaennel's later studies support this view.

The other theory as to the change which takes place in calomel prior to its action upon the liver is that it escapes into the intestine, where it is decomposed and the gray oxide of mercury precipitated, which may, however, be held in solution by any fatty materials, which, being mixed with alkaline liquids, practically form soaps. It is thought by Wood and others that this is the more probable result, particularly in view of the fact that calomel acts more like blue mass than corrosive sublimate. Further than this, these opinions are confirmed by the fact, with which all of us are familiar, that the hepatic influence of calomel is much more positively asserted if at the same time small doses of the bicarbonate of sodium are administered. Under these circumstances the bicarbonate of sodium naturally diminishes, to some extent at least, the acidity of the gastric contents, and also directly or indirectly tends to increase the alkalinity of the contents of the duodenum.

As if to increase the complexity of the problem, the studies of Rutherford and Vignal seem to prove conclusively that in the dog, at least, mercuric chloride has a direct stimulant effect upon the hepatic cells; whereas, calomel, while producing purgation by increasing the secretion of the intestinal glands, in no way increases the true secretion of bile; and this would seem to indicate that, after all, the influence of calomel upon the liver is due to a very minute portion of it being changed into corrosive sublimate. Probably the truth of the matter is, that we have as yet no definite scientific explanation of how calomel really does act. It may be that the solution of the problem lies in the hepatic influence exercised by the presence of minute quantities of corrosive sublimate, and the purgative effect produced by that portion of the calomel which has not been converted into the strong chloride of mercury. This is rendered the more likely in view of the fact that the corrosive sublimate has been found a feeble intestinal stimulant, while the calomel has been found to produce active purgation in dogs, without producing an increase in biliary flow, when the drug has been introduced into the duodenum.

It has been suggested, too, that calomel itself may stimulate the bile-expelling mechanism, while the minute portion of corrosive sublimate increases the secretion of the liquid; and, again, that by means of the purgative effect that it produces certain substances which have been in the intestine are immediately removed, and, as a consequence, a depressant influence upon the hepatic cells no longer exists.

While, at first sight, the argument seems a forcible one that a vast clinical experience in regard to calomel is far superior to any series of experiments on dogs, it is only just to remember that in the entire series of remedies supposed to produce an hepatic effect calomel is the only one which failed to influence the liver of the dog as the others influenced the liver of man.

Quite a number of physicians have studied the effect of the various so-called cholagogue drugs upon the flow of bile in human beings who have had biliary fistula. The most recent and perhaps the best study is that of Pfaff and Balch upon a woman with a biliary fistula. Calomel and the bichloride of mercury seemed invariably in her case to decrease rather than increase the biliary flow. Ox-gall was the only drug which did increase it.

This subject also is of interest to the practical physician in relation to the administration of calomel in compressed tablets or other preparations when mixed with what might be called excipients. Under these circumstances, if one of the excipients is bicarbonate of sodium, the tablet almost always undergoes a change and becomes of a gray color. Those who have used pills or tablets of calomel which have been kept for a long period of time seem to be universally in accord with the statement that they have lost the hepatic effect which a recently-prepared powder always possesses. Thus it has been frequently found that no biliary flow occurs under the use of stale tablets, whereas free bilious purging follows the administration of freshly-prepared powders.

Calomel and blue mass are largely used in the condition known as *biliousness*, and undoubtedly give relief. (See Biliousness.) If the tongue is heavily coated, the breath foul, the conjunctiva a little icteroid, and headache is present, either of them should be employed. In *remittent malarial* fever the use of small repeated doses of calomel will often bring relief from the vomiting, and it should always be given in the treatment of malarial disease before quinine is used if a thorough action of the antiperiodic is required.

As a Disinfectant.—The disinfectant and germicidal power of bichloride of mercury and of the biniodide is very well established by clinical experience and experimental investigation. The strength of the bichloride in solution for antiseptic purposes may vary from 1 to 2000 to 1 to 20,000 of water, and for disinfectant use from 1 to 500 to 1 to 1000. (See Antiseptics.)

In using the bichloride of mercury as an antiseptic it is necessary to add a few grains of tartaric acid to the solution to prevent its uniting with the albumin of the tissues to form an insoluble and useless albuminate. The same is true of the use of mercury biniodide.

As an Antiphlogistic.—The antiphlogistic or anti-inflammatory action of mercury is very marked indeed, but its employment is absolutely limited under these circumstances to one variety of inflammation—namely, the sthenic or dynamic form. In inflammation arising during the course of some exhausting disease mercury is not only contraindicated, but harmful. Thus, if a man in health is stricken with *pleurisy* or *peritonitis* or *meningitis* or any acute inflammation of a serous membrane, be the cause what it may, the exudate poured out will probably be fibrinous, and capable of undergoing organization, thereby causing adhesions of the pleural surfaces, of the intestines, or of the meninges of the brain. On the other hand, if a man be taken with pleurisy or meningitis during the course of phthisis or typhoid fever, the exudate will be serous and large in quantity. It is in the first case that mercury should be used to prevent the fibrinous exudate or to make it serous. In the second instance it will do harm by increasing the exudation.

When mercury is given as an antiphlogistic, opium is often combined with it to relieve the pain and irritation and to prevent purging. In *meningitis* arising from head injuries this is a routine treatment, and may be carried out by the use of powders containing ¼ grain (0.015) of calomel and ¼ grain (0.015) of powdered opium every hour till 1 or 1½ grains (0.05–0.07) of each are taken. The simultaneous use of the ice-bag to the head and perfect quiet will often bring relief very rapidly.

Mercury is also the best remedy in *sthenic endocarditis*, and should be given in full dose. The bichloride may be used in small doses in place of the calomel, and does not, of course, produce the same tendency to laxity of the bowels. On the other hand, it often seems to be less efficacious.

Mercury in *myocarditis* and *pericarditis* is also of service, and certainly exerts distinct prophylactic power in the early stages of *diphtheria* and *membranous croup*. (See Diphtheria.)

One of the best ways to employ any of the various forms of mercury is in the form of triturates, which may be prepared by triturating 10 parts of the drug with 90 parts of milk-sugar. The minute subdivision of the medicament aids in its efficiency, because of its more ready absorption.

Leaving the general subject of mercury, we may now consider each individual preparation.

Ammoniated Mercury.

White Precipitate, or Ammoniated Mercury of the strength of 10 per cent. with lard (*Hydrargyrum Ammoniatum*, *U. S.* and *B. P.*), is used in an ointment (*Unguentum Hydrargyri Ammoniati*, *U. S.* and *B. P.*) in various skin affections, when a stimulating application is needed, as, for example, in *psoriasis* and *chronic dry eczema*. It is also sometimes employed as a parasiticide in cases of tinea. The official ointment should generally be diluted with lard, as it is far too strong and will often induce a dermatitis if used undiluted.

In *ozæna*, whether syphilitic or not, Trousseau has recommended the employment of the following powder as a snuff:

℞.—Hydrargyri ammoniati . . . . gr. iv (0.2).
Pulv. sacchar. alb. . . . . ℥ss (16.0).—M.
S.—To be used as a snuff, after thoroughly blowing the nose.

The red precipitate may be used instead of the white. The treatment removes the stench and may cure the complaint. It may, however, irritate the mucous membrane, in which case it should be used in the strength of 2 grains to the $\frac{1}{2}$ ounce (0.1 : 16.0). It is never used internally.

Bichloride of Mercury.

The Bichloride of Mercury, or Corrosive Sublimate (*Hydrargyrum Chloridum Corrosivum, U. S.; Hydrargyri Perchloridum, B. P.*), as it is called, is an exceedingly poisonous and irritating substance when taken internally in concentrated form.

Taken internally, it causes violent pain in the stomach, vomiting, purging of mucus, blood, and the contents of the intestine, collapse, syncope, and death. If taken in poisonous amount, the patient should be made to swallow large quantities of the antidote, white of egg, the stomach should be washed out with the stomach-pump, heat should be applied about the body, and the proper stimulants be given if the pulse or respiration fail. If death does not occur at once, the patient generally has a protracted convalescence or else dies from the organic changes produced in the gastro-intestinal tract, such as strictures, sloughs, destruction of the peptic glands, and ulcerations.

The bichloride of mercury is an exceedingly useful preparation of mercury for hypodermic injection in ***syphilis***, and is better than calomel for this purpose. About $\frac{1}{6}$ grain (0.012) may be injected deeply and gently into the cellular tissues every two or three days. When the injections are made the greatest possible cleanliness should be obtained. The needle should be aseptic and the hands of the operator well disinfected. The best place for the injection is in the gluteal region or between the shoulder-blades.

Mercury bichloride, aside from its antiseptic use (see Antiseptics), is of great value when given internally, not only in syphilis, but in other states not associated with any such depraved condition, as in *chronic Bright's disease*. In *diphtheria* it may be used to prevent fibrinous exudation as readily as calomel (see Diphtheria), and in tonsillitis, where the inflammation is severe, it is often used with great service.

In small amounts—that is, in $\frac{1}{60}$ to $\frac{1}{40}$ of a grain (0.0015–0.0017) three times a day—the bichloride is one of the best remedies which we possess for the treatment of *anæmia* depending upon a deficient number of blood-cells. If the anæmia is syphilitic in origin, it is, of course, peculiarly useful.

Bichloride of mercury is of value in minute doses of $\frac{1}{500}$ to $\frac{1}{50}$ of a grain (0.0003) for the ill-smelling green stools of *summer diarrhœas* in adults and children, and it has been recommended that a solution be made of $\frac{1}{2}$ a grain (0.03) in 5 ounces (160.0) of water, and a teaspoonful given every hour until relief is obtained. The water used in making the solution should be distilled, and it may be well to add to it a little tartaric acid to prevent precipitation of the bichloride by organic matter which may have gotten into the water. This treatment is particularly useful in *mucous diarrhœa* in which blood and mucus are thoroughly mixed. Patients in the dispensaries often speak of these passages as containing "corruption," and others think they consist of "lumps of flesh," owing to the masses of blood and mucus. Whether the disease be acute or chronic, the bichloride, used in the way just described, will be found of service. In *dysentery* and the *diarrhœa* of adults the same treatment may be resorted to, using 2 teaspoonfuls of the solution instead of 1. It is hardly necessary to add that the greatest care must be bestowed upon the diet and clothing. The author has treated a child suffering from persistent diarrhœa for months with varying success, only to succeed when, it being found that the abdomen was exposed to the air, the mother was forced to apply and keep on the child a flannel binder.

In some cases in which an *obstinate syphiloderm* is present ½ an ounce (16.0) of corrosive sublimate and 1 ounce (32.0) of chloride of ammonium may be added to a warm bath, which should be taken every few days. ½ a grain (0.03) of the bichloride of mercury in 6 ounces (192.0) of water is said to be most efficient as an injection in *gleet*, if used every three or four hours. (See Gonorrhœa.)

In all *parasitic affections of the skin* a solution of 2 grains (0.1) of bichloride to the ounce (32.0) of water may be sopped on the part three times a day. A solution of perchloride of mercury (*Liquor Hydrargyri Perchloridi*) is official in the *B. P.:* it is prepared by adding ½ grain (0.03) of the perchloride of mercury to 1 ounce (32.0) of water, with ½ grain (0.03) of ammonium chloride to hold it in solution.

(For the antiseptic uses of the bichloride of mercury see Antiseptics and Disinfectants.)

Biniodide of Mercury.

Mercury Biniodide (*Hydrargyri Iodidum Rubrum, U. S.* and *B.P.*) is a bright-red powder, possessing irritating powers equal to or above those of the bichloride, and causing symptoms, when taken in overdose, closely resembling those produced by the latter drug. Owing to the formation of the salt, it is thought to be particularly useful in the later stages of *syphilis*. The dose is $\frac{1}{30}$ to $\frac{1}{15}$ of a grain (0.003–0.006). (See Syphilis.) An ointment (*Unguentum Hydrargyri Iodidi Rubri, B. P.*) is useful as an application in *goitre* and *obstinate skin diseases*.

At one time it was thought that biniodide of mercury was a better antiseptic than the bichloride, but recent researches have proved that this is not a fact.

Black Wash.

Black Wash (*Lotio Hydrargyri Nigra, B. P.*) is made by adding 1 drachm of calomel to a pint (4.0 : ½ litre) of lime-water. It is used as a stimulant application for washing *syphilitic sores* and *wounds* and in various forms of *eczema*.

Blue Mass.

Blue Mass (*Massa Hydrargyri, U. S.; Pilula Hydrargyri, B. P.*) is made by rubbing up metallic mercury with liquorice and other excipients, and is often called Blue Pill. Each grain of the mass contains $\frac{1}{3}$ grain (0.02) of mercury, and it may be given in the dose of from $\frac{1}{2}$ to 20 grains (0.03–1.3) for the same laxative purposes for which we use calomel. Blue mass is rarely used to produce systemic effects.

Calomel.

Calomel (*Hydrargyri Chloridum Mite, U. S.; Hydrargyri Subchloridum, B. P.*), or the Mild Chloride of Mercury, is an insoluble salt which is, nevertheless, freely absorbed.

Calomel when used as a laxative purge should be given in the dose of $\frac{1}{6}$ to $\frac{1}{2}$ grain (0.01–0.03) every half-hour or every fifteen minutes until 1 or 2 grains (0.05–0.1) are taken, as it will act as efficiently in this way as if 10 grains (0.65) are given at one dose, and there is no danger of producing ptyalism. The reason that small doses are as efficient as large ones lies in the fact that only the calomel which is changed into the gray oxide is active, and, as the amount of alkaline juice in the intestine is small, only a minor part of a large dose of calomel acts, the major portion escaping unchanged. This is the reason that bicarbonate of sodium is added to calomel powders, to aid the intestinal juice in the reduction of the salt. If purgation does not occur after a dose of calomel, a saline purge may be given at the end of twenty-four hours, and this must always be used if large doses of the mercurial are employed, to avoid possible mercurialization.

Mercury in the form of calomel is very largely used hypodermically, being held in solution by a mucilage, or, better still, by fluid cosmoline. Best of all, however, is the employment of chloride of sodium in water with the calomel, in the proportion of 5 parts each to 50 parts of water. It should be injected deeply into the tissues, not immediately underneath the skin, the greatest cleanliness being necessary to avoid abscesses. The best place for these injections is in the fold of the buttocks, but sloughing, tetanus, and even gangrene, has followed its employment in this way. (See also Salicylate of Mercury and Bichloride of Mercury.)

In *dysentery* of the acute form calomel and ipecac are the two best remedies. (See Dysentery and Ipecac.) The calomel should be given in small doses, repeated every hour or half-hour until a favorable change in the number and character of the stools appears. Calomel is not to be used if great asthenia complicates the disease.

In children who seem constantly "under the weather" and never quite well, who have *flatulence*, *fœtid breath*, and *ill-smelling, pasty stools*, calomel often gives great relief in the dose of $\frac{1}{20}$ of a grain (0.003) every half-hour until four doses are taken, this treatment being pursued every fourth or fifth morning.

In *jaundice* due to exposure to cold and to slight hepatic congestion $\frac{1}{6}$ of a grain (0.01) of calomel every half-hour until 1 grain (0.06) is taken will often bring relief.

Calomel is generally prescribed in conjunction with sugar of milk, white sugar, or bicarbonate of sodium, which are added to increase the bulk and wieldiness of the powder, and, in the case of the latter ingredient, to increase its activity. Owing to its lack of taste, calomel is often placed on the tongue in children, but for this class of patients white sugar is to be used in small quantity, as the other vehicles are less agreeable. The most agreeable form of administration is by means of triturates.

It is important to remember that calomel, when used as an antisyphilitic, produces salivation very much earlier than the other mercurials.

Sometimes calomel is of value when dusted into the eye in cases of *phlyctenular conjunctivitis* which are strumous. This practice must not be resorted to if iodine or iodides are being taken internally, as the iodine is eliminated by the tears and forms a compound which burns the conjunctiva.

A very important use of calomel, and one which has been brought forward very recently as new, but which is really many years old, is its employment in *dropsy* as a diuretic, either alone or combined with squills or digitalis, or with opium to prevent purging. The dose is small, about 1 grain (0.05) thrice a day, and if a diuretic influence does not assert itself in forty-eight hours it should not be continued. How calomel acts to produce the increased urinary flow under these circumstances we do not know. Some suppose that it aids the absorption of liquid from dropsical tissues, and so increases urinary secretion; others think that it stimulates the renal epithelium to greater activity. The latter seems the least probable of the two, but neither theory has been proved correct, although experimentation supports the view first named. The full urinary effect of the drug is not felt till the second or third day of its use, and speedily passes away, particularly as purging is often induced very early. Still another use of calomel is in *typhoid fever*, in which disease it has been highly recommended in small repeated doses, particularly if constipation is present. In the opinion of the author this is disadvantageous as a routine measure and entirely uncalled for, although in the very early stages of the disease, when the bowels are confined and the tongue coated, a dose of 1 grain (0.05) in fourths with a little bicarbonate of sodium is useful.

Sydney Ringer has called attention to the fact that in constipation or in "biliousness" podophyllin does more good than calomel, provided that the stools are dark in color, whereas if the same signs are present, but the stools light and clayey in color, calomel is more efficient. The author has proved the correctness of this assertion so frequently that he is convinced of its truth.

Calomel has been recommended in the condition of *anorexia* and depression following acute diseases, and when the tongue is covered by a thick yellow coat it is the remedy for the gastro-intestinal torpor always present. While purgative doses of calomel certainly are of value, the use of freshly-prepared nitro-muriatic acid is, however, highly preferable to the mercurial salt in many such instances.

Calomel is often given in small doses to "settle the stomach." Sometimes it will act in this way, but in other cases it will seem to increase the nausea and bring on vomiting. This is true of both adults and children, and it is impossible to tell beforehand which will occur. Ringer asserts that in a peculiar form of vomiting occurring in very young children, which comes on immediately after the food is swallowed, the rejection of milk being forcible, and perhaps so sudden that it is not even curdled, and which is not accompanied by much straining, calomel will often give relief when all other remedies fail. It should not be resorted to until some evidences of wasting occur, as this action of the stomach in many children only rids that organ of that part of the milk which is in excess, and is a purely physiological regurgitation. The calomel may be given in the dose of $\frac{1}{12}$ of a grain (0.005) every hour, or, if preferred, gray powder in the dose of $\frac{1}{3}$ of a grain (0.02) every hour for three doses is equally efficient in these cases.

Calomel in a fine powder will often remove *syphilitic condylomata* if dusted over them for some time, and an ointment made of 1 drachm (4.0) of calomel to 1 ounce (32.0) of lard is very useful in *pruritus*.

Calomel ointment (*Unguentum Hydrargyri Subchloridi*, *B. P.*) is often useful in the treatment of small patches of eczema, or the following prescription may be given for its use:

℞.—Hydrarg. chlor. mit.	gr. xl (2.65).
Magnesiæ carbonatis	gr. xl (2.65).
Unguent. aquæ rosæ	℥j (30.0).—M.

Gray Oil.

Gray Oil is prepared as follows: 2 drachms (8.0) of lanolin is rubbed up with enough chloroform to emulsify it. The rubbing process is continued until most of the chloroform is evaporated, and while the mixture is still in a fluid state metallic mercury, in double the amount of lanolin, 4 drachms (16.0) is added and the trituration continued. By this means an ointment of mercury is left which equals 2 parts of mercury and 1 of lanolin. This is sometimes called Strong Gray Ointment. For hypodermic injection 3 parts of this gray ointment are added to 1 part of olive oil, or it may be still further diluted by adding olive oil in the proportion of half-and-half. Of this mixture 1 to 2 minims (0.05–0.1) may be injected every second or third day.

With some practitioners this preparation is considered much better than any other for hypodermic use in syphilis.

Mercury with Chalk.

Mercury with Chalk (*Hydrargyrum cum Creta*, *U. S.* and *B. P.*), or Gray Powder, is slightly purgative, but is chiefly employed in the treatment of *infantile syphilis*, as it will not freely purge. It is composed of 38 parts of mercury, 12 parts of sugar of milk, and 50 parts of prepared chalk. The dose is 1 to 10 grains (0.06–0.65). Children suffering from *syphilitic marasmus* seem fairly to fatten on it. This preparation is also of service in the syphilis of adults, and may be employed whenever the laxative effect of mercury is not desired.

In the treatment of *infantile diarrhœa* with watery, colorless stools containing undigested food gray powder in small doses is often very useful.

Mercury Ointment.

The Ointment of Mercury, Mercurial Ointment (*Unguentum Hydrargyri, U. S.* and *B. P.*), sometimes called Blue Ointment, is made by rubbing up mercury with suet and lard until the mercury is extinguished, or, in other words, until the globules of mercury cannot be seen with a magnifying power of ten diameters.

The ointment of mercury is used externally in certain skin affections and for the purpose of influencing the general system in cases where the drug cannot well be taken by the mouth. In *syphilis* where a mercurial effect is to be reached the ointment in small amounts should be thoroughly rubbed into the skin in various parts of the body—one evening in the left groin, the next in the right groin, the next evening in the left axilla, and the fourth evening in the right axilla, beginning on the fifth evening in the left groin once more. This avoids local irritation of the skin by means of too frequent applications, places the drug on spots where it is readily absorbed, and very rapidly influences the system of the patient. In *infantile syphilis* this method may be employed, or a flannel binder covered with the ointment may be placed about the belly. The clothes should not be changed too frequently, as their saturation with the drug aids in producing the impression upon the system, and the wearing of an undershirt saturated with the ointment after a few days' wear is a very valuable, though somewhat dirty, method of producing mercurialization. The ointment of mercury is sometimes rubbed into the skin over *enlarged glands*. Under the name of Oleate of Mercury (*Oleatum Hydrargyri, U. S.* and *B. P.*) a very efficient and more agreeable application than the ointment is used in the same manner or still further diluted with lard. It is made from the yellow oxide of mercury. (See Oxides of Mercury.)

For *pediculus pubis*, or in any case where parasites, such as the flea or louse, infest the region of the genitals or any spot covered by a hairy growth, mercurial ointment may be used as a remedy, owing to its lethal influence over these troublesome pests. Care should be taken that it does not cause salivation of the patient, and it must not be allowed to remain on the parts, but be wiped off in the course of an hour or two or less. The following words from the pen of Dr. Joseph Leidy are sufficiently interesting to demand a place at this juncture: "We may here say that if it is once understood that all insects, including lice, are destroyed quickly by the application of any fixed or volatile oil, physicians will see there is no necessity of employing remedies of a noxious character to the patient. The fat of mercurial ointment is probably more active than the mercurial oxide."

Mercurial suppositories (*Suppositoria Hydrargyri, B. P.*) are used when a mercurial effect is desired without the danger of interfering with the digestion.

Linimentum Hydrargyri, B. P., and *Emplastrum Hydrargyri,* *U. S.* and *B. P.*, are used for the same purposes as is the ointment of mercury. The plaster is made with olive oil, resin, and lead plaster instead of ordinary suet or lard.

Nitrate of Mercury.

The Solution of Mercuric Nitrate (*Liquor Hydrargyri Nitratis, U. S.* and *B. P.*), Acid Nitrate of Mercury, is an exceedingly active, penetrating caustic, so rapid in its effects that it seems to drop through the tissues. It may be employed for the removal of *epitheliomata* and *large warts*, and should be applied by means of a glass rod. This treatment may also be resorted to with advantage in *lupus* until the surface of the growth is level with the skin. The surrounding parts should be protected by lard or oil.

As this treatment is very painful, the spot may be first cocainized and afterward covered with flexible collodion.

Citrine Ointment (*Unguentum Hydrargyri Nitratis, U. S.* and *B. P.*) is used as a stimulating application in cases of *chronic skin diseases* of the scalp and trunk. It is too strong for ordinary use, and should be diluted one-half or less with lard according to the stimulating effect required; the dilute ointment is official in the *B. P.* as *Unguentum Hydrargyri Nitratis Dilutum.*

Oxides of Mercury.

The Yellow and Red Oxide of Mercury (*Hydrargyri Oxidum Flavum, U. S.* and *B. P.* and *Hydrargyri Oxidum Rubrum*), *U. S.* and *B. P.*.), Red Precipitate, are used largely as a dressing for syphilitic sores when diluted about one-half with chalk or other powder. If used pure, they are somewhat caustic. From the yellow oxide is made the Oleate of Mercury (*Oleatum Hydrargyri, U. S.* and *B. P.*), which is used for the same purpose as ordinary mercurial ointment.

In *intestinal* and *gastric indigestion*, with foul belching and very ill-smelling stools which are due to intestinal sepsis, the yellow oxide is sometimes given in the dose of $\frac{1}{60}$ to $\frac{1}{50}$ of a grain (0.001–0.0012) in a triturate.

Red Precipitate Ointment (*Unguentum Hydrargyri Oxidi Rubri, U. S.* and *B. P.*) and the Ointment of the Yellow Oxide (*Unguentum Hydrargyri Oxidi Flavi, U. S.*) are largely used, diluted one-half with lard, for *chronic scaly skin affections*, in *obstinate conjunctivitis*, and in *granular lids* and *styes*. (See Styes.) They should always be freshly prepared.

Protiodide of Mercury.

Mercury Protiodide (*Hydrargyri Iodidum Flavum, U. S.*) is much more mild than the biniodide, and is given for exactly the same purposes. It is very useful in *chronic Bright's disease.* It is to be remembered as the best mercurial preparation for ordinary cases of syphilis. The dose is $\frac{1}{6}$ to $\frac{1}{4}$ of a grain (0.01–0.016) three times a day.

Yellow Sulphate of Mercury.

Hydrargyri Subsulphas Flavus, U. S., has been used under the name of Turpeth Mineral as an errhine in chronic ophthalmia and also as a prompt emetic in *croup*. It is a quick and certain emetic, and, it is claimed, does not produce depression, but the writer would recommend great care in its use. The dose for a two-year-old child is 2 to 5 grains (0.1–0.35), repeated in fifteen minutes if necessary.

If as much as 5 grains (0.35) has been given, and emesis does not follow, other emetics or the stomach-pump must be used to prevent gastro-intestinal irritation.

Yellow Wash.

Yellow Wash (*Lotio Hydrargyri Flava, B. P.*) is made by adding 30 grains (2.0) of corrosive sublimate to a pint (½ litre) of lime-water. It is used for the same purposes as the black wash already mentioned, but is much more stimulating in its influence.

Incompatibles.—Bichloride of mercury should never be given with any other substance except iodide of potassium and chloride of ammonium, as it is incompatible with almost every other drug. With the iodide of potassium it may be used, because the precipitate formed is at once redissolved and the resulting mixture is highly alterative.

Calomel should never be given with iodides or bromides, and hydrochloric acid may convert it into the bichloride if the acid is present in any amount. It is also incompatible with antipyrin.

METHYL BLUE.

Methyl Blue or Methyl Violet is an aniline dye often sold under the name of Pyoktanin. When used medicinally, it must be perfectly pure and deprived of its usual contaminating matter, arsenic, which if present causes local irritation of the part to which it is applied. Pyoktanin was introduced to professional notice under this name by Stilling as an antiseptic, but careful study has proved it to be of very feeble power over the growth of germs. In all conditions of the eye in which antiseptic lotions are indicated pyoktanin has been stated to be of value, but elsewhere in surgery it is practically useless as an antiseptic. Even in the eye it possesses, according to de Schweinitz, a very limited range of usefulness, being no better than the older antiseptics, except in diseases of the lachrymal apparatus. The fact that pyoktanin stains everything it touches is a great disadvantage in its use. It may be tried in *blepharitis*, *eczema of the eyelids*, *conjunctivitis*, both simple and phlyctenular, and in the treatment of *corneal ulcer*. When so employed it should be applied in the strength of 1 to 1000 of water.

It should be remembered that any pure aniline dye may be used in place of pyoktanin. Thus some physicians have used yellow pyoktanin or auramine.

Methyl blue and similar aniline substances are largely employed by some persons in the treatment of *malignant neoplasms*. The solution

(1 to 500 of water) should be filtered through hot asbestos to render it sterile, and every antiseptic precaution carefully adhered to in giving the injection. The dose is ½ to 3 drachms (2.0–12.0) of this solution every other day or every third day, and the injection is to be given either into the growth itself if it is large, or just at the side, in the healthy tissues, if it is small. Too much should not be injected into one spot, lest it cause a slough. This treatment does not cure the disease. It relieves pain and so quiets the patient, and in rare cases stops the growth of the tumor. If the growth sloughs, complete antiseptic dressing is necessary. An antiseptic pyoktanin-gauze dressing should always be used while the treatment is going on.

METHYL CHLORIDE.

Methyl Chloride is a colorless gas, easily liquefied under pressure, with an odor resembling that of ether and chloroform, used to produce local anæsthesia, which it does by absorbing a large amount of heat on passing from the liquid to the volatile state as it strikes the skin. It is usually kept in a small flask which has its end fused into a fine point. This is broken off, and the heat of the hand volatilizes the drug, which is then forced out of the flask in a fine spray. The nozzle should be held ten to twelve inches from the part to be frozen. The skin of the part to be anæsthetized should be washed with soap and ether to remove all fatty substances before the spray is used.

Under these circumstances the skin becomes pale in a few seconds, and afterward perfectly white and parchment-like in appearance. Local anæsthesia is now complete, and minor surgical operations, such as opening boils or abscesses, can be performed without pain. The spray should not be continued more than two to four minutes, as local death of the tissues may result. A great advantage of the spray of methyl over that of ether is its slight inflammability and rapidity of action. Methyl chloride is to be distinctly separated from methylene chloride. The first is monochlormethane, the second dichlormethane.

METHYLENE BLUE.

Methylene Blue is to be distinctly separated in the mind of the student from methyl blue, which is practically what is known by the trade name "Pyoktanin."

Methylene blue has been employed in the treatment of *malignant growths* and in *malarial fevers* with asserted success, although its successful use in the first group of cases is decidedly problematical. When used in the treatment of sarcoma and cancer, from ½ to 2 grains (0.03–0.12) in watery solution are injected directly into the growth. The neoplasm, it is said, ceases to grow, shrinks, and comes away, leaving a fairly healthy sloughing surface. This treatment is so uncertain that it should only be tried in inoperable cases.

In *malarial fever* of the intermittent type methylene blue seems to possess very distinct curative powers if we can rely on the studies of Thayer, Kasembeck, Mya, and others. It is not so powerful as quinine by any means, but has its chief sphere of usefulness in patients who cannot take quinine or where quinine has been tried unsuccessfully. This antimalarial influence is due to its destruction of the *plasmodium malariæ*, but its administration must be continued after the attacks have ceased and for some little time after the physician fails to find the micro-organism in the blood, as relapses are common. Particularly good results seem to follow the use of methylene blue in children suffering from malaria. Untoward symptoms from its use are not common, but when they do occur consist in slight vertigo, nausea, and some strangury. The urine is always blue from the elimination of the drug through the kidneys.

Recently Levy has employed methylene blue in the dose of from 1 to 2 grains (0.05–0.1) four times a day in the treatment of *migraine*. It is to be given in capsule with kola. He states that as much as 15 grains (1.0) may be given in a day with safety. The dose is 2 to 4 grains (0.1–0.2) every four hours to adults, or 1 to 2 grains (0.05–0.1) to children of five years, preferably given in capsule.

METHYLENE CHLORIDE.

Methylene Chloride is made from chloroform or by the action of chlorine on marsh-gas, and is a colorless liquid resembling chloroform in odor. It is readily decomposed by light, which process may be hindered by the addition of a little absolute alcohol.

Therapeutics.—It is employed as an anæsthetic in a manner like chloroform, and was introduced as a safe substitute for that drug, but it is of doubtful safety and is little used. It has been used as a spray for the production of local anæsthesia. As stated under Methyl Chloride, it is not to be confounded with that drug.

In England, under the name of methylene chloride or methylene, a mixture of ethyl ether and methylene chloride has been widely employed. This preparation is, of course, to be distinguished from true methylene chloride. The amount of this mixture used to produce anæsthesia is 1 to 2 drachms (4.0–8.0) for minor and 3 to 6 drachms (12.0–24.0) for major operations. The term "methylene chloride" has also been applied to a mixture of chloroform and methyl chloride.

MEZEREUM.

Mezereum, *U. S.* (*Mezerei Cortex*, *B. P.*), is the bark of *Daphne Mezereum*, a plant of Asia, Europe, and Great Britain. It is supposed by some to be possessed of extraordinary alterative power, but this is certainly a mistake, as its influence in this line is very feeble. It is never used internally except in compound decoction of sarsaparilla. It is distinctly irritant, and in overdose causes all the symptoms of gastro-enteritis. Mezereum is so irritant as to have been used externally as a counter-irritant in the form of the ointment

(*Unguentum Mezerei*). It enters into the compound syrup, fluid extract, and decoction of sarsaparilla. The official preparations of mezereum are the fluid extract (*Extractum Mezerei Fluidum, U. S.*) and the ethereal extract (*Extractum Mezerei Æthereum, B. P.*), both of which are used as external irritants.

MUSK.

Musk (*Moschus, U. S.* and *B. P.*) is obtained from the preputial follicles of the *Moschus moschiferus* or musk deer of Thibet, and is a substance possessing the most remarkable penetrating powers, so far as odor is concerned. Very little of the musk for sale in the shops is pure, and most of it is not musk at all. Its price varies very greatly, but if sold for less than twenty-five cents a grain it is probably worthless or impure.

Therapeutics.—For some unknown reason musk acts as a diffusible stimulant and supports the system. It is also an antispasmodic and nervous sedative. In all *low fevers* where the strength of the patient is fast ebbing away and the nervous symptoms are those of the most advanced depression, rectal injections of musk in starch-water should be employed. The dose should be 5 to 10 grains (0.35–0.65). This drug is of value where either *nervous excitement* or *nervous collapse* is present, but is not to be employed until it is absolutely needed to carry the patient past a crisis. If frequently employed, it loses its power and the expense is a needless one.

Musk is one of the best remedies in *obstinate hiccough*.

The dose of the tincture (*Tinctura Moschi, U. S.*) is 30 drops to 1 drachm (2.0–4.0), and of musk itself 5 to 10 grains (0.35–0.65).

MUSTARD.

Mustard is official in the form of *Sinapis alba, U. S.*, and *Sinapis Albæ Semina, B. P.*, or white mustard, derived from the seeds of *Brassica alba*, and *Sinapis nigra, U. S.*, and *Sinapis Nigræ Semina, B. P.*, or black mustard, derived from the seeds of *Brassica nigra*. Both of these contain an irritant oil (*Oleum Sinapis Volatile, U. S.; Oleum Sinapis, B. P.*) as their chief active constituent.

Therapeutics.—Mustard is often used in the form of mustard flour as an emetic when stirred up in water in the proportion of 2 tablespoonsful to a glass of water. It is also employed as a counter-irritant and as a condiment. If given in excessive dose, it will cause violent gastritis, and chronic gastritis is often set up by its constant use in excess. Its internal use is contraindicated during the existence of acute gastritis and all states of gastro-intestinal irritation.

When used as a counter-irritant mustard is applied to relieve the pain of *colic* due to *flatulence* and *acute inflammation* of the thoracic and abdominal viscera, that due to *muscular rheumatism, inflamed joints*, and *neuralgia*, and it may be applied at the nape of the neck in cases of ***headache*** and ***cerebral congestion.*** When applied to the skin of an ordinary individual, it will produce a bad burn if left on more than a few minutes, and it should be mixed with wheat flour in the proportion of half-and-half when used upon persons having tender skins. Children generally will not stand more than one-fourth mustard. The plaster should be made with warm water or vinegar, or a little brandy may be used. Mustard plaster (*Cataplasma Sinapis*) is official in the *B. P.*

The scald or burn produced by mustard is peculiar in its slowness to heal and in the fact that it is tender and reddened for days. If the burning of the mustard becomes excessive, it should be treated by applying a piece of lint soaked in lime-water and olive oil, half-and-half, or olive oil alone may be used.

The oil of mustard is very irritant, and almost epispastic in its effects. It is sometimes given in the treatment of the ***atonic stomach*** of drunkards in the dose of ¼ to ½ a drop (0.016–0.03). *Charta Sinapis, U. S.* and *B. P.*, or mustard-papers, are sometimes called ***sinapisma***, and these afford a ready means of applying this counter-irritant. They are generally very strong, and one or two layers of thin and moistened linen should be placed between the skin and the sinapism to prevent too great an action. (See Counter-irritation.) The compound liniment (*Linimentum Sinapis Compositum, U. S.* and *B. P.*) is composed of the oil of mustard, castor oil, extract of mezereum, and alcohol.

MYRRH.

Myrrha, U. S. and *B. P.*, is a gum-resin obtained from *Commiphora Myrrha*, a tree of Arabia. It occurs in dark-colored tears, and contains an active principle, myrrhin.

Therapeutics.—Myrrh, in medicinal amount, is a stimulant to the circulation and to the uterine and the bronchial mucous membranes.

In *amenorrhœa* due to functional inactivity or *anæmia*, "iron and myrrh" is a standard remedy.

The tincture of myrrh, diluted one-half, is useful in ***ulcerated sore throat*** as a gargle, and the pure tincture is sometimes applied with a small brush or by the end of the finger to ***spongy*** or ***tender gums.***

In *[illegible]rrhœa* depending upon uterine trouble and in ***chronic [illegible]*** myrrh is often of service. Sometimes it enters into expectorant mixtures given in the *later stages of bronchitis.* The dose of the tincture (*Tinctura Myrrhæ, U. S.* and *B. P.*) is 10 to 30 drops [illegible]. It also enters into the composition of *Pilulæ Aloes et Myrrhæ, U. S.* and *B. P.*, dose two to five pills, and *Tinctura Aloes et Myrrhæ, U. S.* and *B. P.*, the dose of which is 1 to 2 fluidrachms [illegible].

NAPHTHALIN, or NAPHTALENE.

[illegible], U. S., is a coal-tar derivative occurring in colorless [illegible] like crystals, possessing a peculiar smell, and soluble in

alcohol to some slight extent. Helbing states that naphthalin when pure is colorless and without action on moist litmus-paper. It should also dissolve in concentrated sulphuric acid without color when gently warmed. After it is taken for some time, or even after the first dose, the patient will state that when he belches the gas has the smell and taste of burning rubber.

The drug possesses distinct antiseptic power, and for this reason has been employed in certain gastric and intestinal diseases associated with fermentative changes or dependent upon ulceration and organic lesions. In *fœtid diarrhœa* it may be given as a deodorant and cure.

When given to children, as in *summer diarrhœa*, the dose should be ⅙ to ¼ grain (0.01–0.015) every two or four hours, but adults may take as much as 5 to 10 grains (0.35–0.65). More than this will disorder the stomach. The drug should be given in powder, with sugar, or in capsule. It has not been as widely employed as was expected when it first came before the profession, and certainly often fails to do good.

In cats and rabbits naphthalin, when administered continuously for a considerable period of time, produces cataract.

NAPHTOL.

Naphtol (*U. S.*), often called Beta-naphtol, has been introduced in the *U. S. P.* of 1890. It is used for precisely the same purposes as naphthalin internally, and is generally artificially prepared from naphtalin. It is also used in antiseptic dressings. The dose is 2 to 5 grains (0.15–0.3).

NITRATE OF POTASSIUM.

Nitre (*Potassii Nitras, U. S.* and *B. P.*), or Saltpetre, occurs in long needle-like crystals and has a sharp, saline taste. Sal prunella is saltpetre melted and run into moulds.

Next to the chlorate of potassium, this is the most poisonous of the potassium salts, and produces when taken in overdose symptoms of violent gastro-enteritis. While it does not affect the blood, it is more irritant than the chlorate.

Nitrate of potassium is rarely employed at present, and has been very properly put aside as inferior to the harmless vegetable potassium salts (the citrate, acetate, and bitartrate). If used in *rheumatism*, the dose should be 1 ounce (32.0) in a pint (½ litre) of barley-water or syrup of acacia and water, to be taken in divided doses of a tablespoonful every three hours. Nitrate-of-potassium papers (*Charta Potassii Nitratis, U. S.*) are made by dipping unsized paper in a solution of the drug of the strength of 20 parts of the salt to 80 parts of distilled water. They are rolled into cigarettes and smoked by *asthmatics*, or burned in a pan and the fumes arising from them inhaled. Their efficacy may be increased in cases where the respiratory mucous membrane is irritable by dipping them in compound tincture of benzoin and exposing to the air long enough to dry. They should then be protected from the air until used.

The paper should be moderately thin bibulous paper.

NITRATE OF SILVER.

Nitrate of Silver (*Argenti Nitras, U. S.* and *B. P.*) is a heavy crystalline salt of silver readily soluble in its own weight of water.

It is official as the pure nitrate (*Argenti Nitras, U. S.* and *B. P.*) and as the sticks or fused rolls (*Argenti Nitras Fusus, U. S.*), or lunar caustic. The latter are never used in medicine internally, only the crystals being employed. Applied to the tissues of the body or other substances, nitrate of silver causes a brown and finally a black stain, which is due to the formation of an oxide of silver.

Physiological Action.—Nitrate of silver is one of the few astringent substances which are applicable to inflamed mucous membranes, as it is, with lead, bismuth, and zinc, one of the few drugs of this class which is not irritant as well as astringent. Locally applied, it acts in pure form as a powerful caustic, which is, however, very superficial in its effects, as the drug coagulates the albumin with which it comes in contact and thereby forms a coat which protects the tissues beneath.

The action of the drug upon the circulation, respiration, and similar vital functions is only partly known, and has no relation to its employment in medicine.

Nitrate of silver is eliminated from the system very slowly indeed.

Poisoning.—Almost immediately after the ingestion of a poisonous dose of nitrate of silver violent pain in the belly, with vomiting and purging, comes on. At the same time evidences of widespread gastro-enteritis develop. The abdominal walls are knotted and hard, and perhaps scaphoid. The face is anxious and livid and covered with a sweat. When the vomiting occurs the ejecta are seen to be brown or blackish, or even white and curdy. The lips are stained white, but they rapidly become brown, then black. In some cases the nervous symptoms are severe and convulsions with delirium may occur. The convulsions are epileptiform. Death ensues either from gastroenteritis or from centric respiratory failure, accompanied by a profuse exudation of liquid mucus into the bronchial tubes.

The treatment consists in the use of common salt, which is the chemical antidote, the employment of opium and oils to allay irritation, and in the ingestion of large draughts of milk and of soap and water for the purpose of diluting the poison and protecting the mucous membranes of the œsophagus and stomach from the action of the irritant. The bodily heat must be maintained.

Chronic Poisoning.—This is a form of poisoning quite frequently seen. The most prominent symptom is the pale slate-blue color of the skin, which causes the individual to be most livid and death-like in appearance.

Argyria, as chronic silver poisoning is called, is caused by the continued employment of the drug until it is deposited in the tissues. It is then found in every part of the body. The first signs of discoloration can generally be seen in a darkening of the conjunctiva over the sclerotic coat of the eye or in a dark line on the inner part of the lips.

The treatment of argyria is not hopeful so far as the color of the skin is concerned, but the discoloration may be slightly modified in some cases by the use of iodide of potassium to aid in the elimination of the poison.

Therapeutics.—Internally this salt is used as a cure for *gastric ulcer*, and it is certainly the best remedy we possess if combined with extract of hyoscyamus or opium and given in pill form. In *chronic gastric catarrh* and *gastritis* nitrate of silver is very useful when the patient is troubled with sour eructations or when vomiting occurs after meals. When used in these states it should be given in $\frac{1}{6}$- to $\frac{1}{4}$-grain (0.01–0.16) doses, half to one hour before each meal, in order that the stomach may be exposed to its effects and not be protected by food.

In *intestinal ulceration* the drug has been highly recommended by Dr. Pepper, and under these circumstances should be given in hard or keratin-coated pills, in order that it may escape through the stomach without being chemically changed. In *ulceration* of the *cæcum* and *rectum* and in *acute* and *chronic dysentery* the disease may be attacked by rectal or colonic injections of nitrate of silver. If the cæcum is involved, the solution must be given in large quantity in order to reach the part affected, but if the rectum is diseased, the amount of liquid injected should not exceed 4 ounces, the bowel in either case being washed out beforehand by warm water to rid it of fæces. Soap and water and salt and water must not be used for this purpose, as the soap or salt which remains in the bowel will prevent the silver salt from acting. The strength of the solution employed should be 1 drachm to 3 pints (4.0 : 1500 cc.) of water in cæcal trouble, and 3 grains (0.18) to each 4 ounces (128.0) in rectal trouble. If the latter condition is very obstinate and chronic, the strength may be raised to 5 grains (0.3) to each 4 ounces (128.0).

Whenever nitrate-of-silver injections are used in this way, a solution of salt and water should be made, ready for use, and injected if the action is too severe or as soon as it is thought that the drug has acted with sufficient thoroughness.

Nitrate of silver is the only remedy of any value in idiopathic *anterior* and *posterior spinal sclerosis*, but often fails.

Nitrate of silver has been largely used in *epilepsy* and *chorea*, but is now seldom so employed, and does little good in most cases.

Dr. William Pepper speaks highly of the continual administration of nitrate of silver in pill form in the dose of $\frac{1}{6}$ to $\frac{1}{4}$ grain (0.01–0.015) through the entire attack of *typhoid fever*, and believes it greatly modifies the severity of the disease.

Externally, nitrate of silver is used for many purposes, and will often prevent the *pitting of small-pox* if on the fourth or fifth day the vesicles are punctured by a needle dipped in a solution of nitrate of silver in the strength of 20 grains (1.3) to the ounce (32.0) of water. Others simply paint the skin over the eruption with a solution of 5 to 10 grains (0.35–0.65) to the ounce, claiming that this method is equally effective and prevents inflammation and suppuration.

Higginbottom has highly recommended the use of nitrate of silver over *erysipelatous inflammations*, but the practice is not often resorted to, and is now supplanted by better measures. (See Erysipelas.) In other inflammations of a superficial character nitrate of silver is of great value. Painted in strong solution over the scrotum in the early stages of *orchitis* or *epididymitis*, it will often relieve the pain and swelling, and *felons* can sometimes be aborted by its early application over the surface of the finger.

In all inflammations of the *pharynx*, *larynx*, *fauces*, and *mouth* solutions of silver nitrate are to be used in varying strength. Sometimes after slight exposure to cold or dampness the posterior wall of the pharynx suddenly becomes sore and raw, feeling as if the mucous membrane had been scarified. A solution of nitrate of silver will relieve this, and if it is employed in the strength of 60 grains (4.0) to the ounce (32.0) of water, the application will be more efficacious and less painful than if weaker solutions are employed.

In *laryngeal phthisis* a spray used from an atomizer in the strength of ½ to 2 grains (0.03–0.1) to the ounce (32.0) of water may do good service.

In *whooping cough* Ringer recommends the use of a spray in the strength given above for the purpose of relieving the cough in its violence and frequency and of obtaining a good night's rest. The applications should be made when the stomach is empty, as they are apt to bring on retching. The end of the atomizer must be within the mouth or the skin of the face will be stained.

In the later subacute stages of *gonorrhœa* an injection of nitrate of silver of the strength of gr. ⅓ (0.025) to 3 ounces (90.0) is very useful.

In *uterine ulceration* and in *leucorrhœa* when the cervix is boggy and tender, the application of the solid nitrate-of-silver stick is of service. Its use is often followed by *headache* about the vertex, and this in turn is to be relieved by 10-grain (0.65) doses of the bromides.

In *pruritus pudendi vel ani* and *vulvæ* a solution of 4 to 6 grains (0.25–0.40) to the ounce (32.0) should be painted with a camel's-hair brush over the parts to relieve the itching. The application is to be made from two to four times a day.

Bed-sores may be aborted if, as soon as the skin reddens, a solution of nitrate of silver of the strength of 20 grains (1.3) to the ounce (32.0) is applied with a brush to the part. This measure fails in paralytics.

Boils which begin in a small limited papule with a surrounding area of inflammation may be aborted by the use of a strong solution of this salt.

In *granular lids*, *conjunctivitis*, and similar affections about the eye nitrate of silver in stick form or in solution is largely and successfully employed. (See Conjunctivitis.)

When it is desired to remove nitrate-of-silver stains, they should be washed with a solution made of cyanide of potassium 2½ drachms (10.0), iodine 15 grains (1.0), and water 3 ounces (96.0); or dissolve 15 grains (1.0) corrosive sublimate in 7 ounces (200.0) of boiled water, add about 45 grains (3.0) of cooking salt (a scant teaspoonful) just before using, lay the stained materials in it for about five minutes, and then wash them two or three times.

Administration.—The dose of nitrate of silver is $\frac{1}{6}$ to $\frac{1}{4}$ of a grain (0.01–0.015) in pill form. Mitigated caustic, or diluted nitrate of silver (*Argenti Nitras Dilutus, U. S.; Argenti et Potassii Nitras, B. P.*), is composed of equal parts of nitrate of silver and potassium nitrate, and is used as a mild caustic.

The drug when given continuously should be discontinued for two weeks at the end of the eighth week, as it is so slowly eliminated as to accumulate in the body and cause argyria, but Lewin and Soullier assert that the smallest aggregate amount on record which has produced argyria is 1 ounce.

NITRIC ACID.

Nitric Acid (*Acidum Nitricum, U. S.* and *B. P.*), the strongest and most corrosive of the mineral acids used in medicine, is a clear liquid, becoming slightly yellow with age. It should be kept in dark, glass-stoppered bottles.

Physiological Action.—Nitric acid acts, when in pure form, upon the tissues of the body as a powerful caustic. Applied to the mucous membranes, well diluted, it acts as an irritant or astringent, and when taken internally it exerts a stimulating influence over the secretory glands of the stomach and small intestines. It does not tend to relax the bowels, as does nitro-hydrochloric acid. Continued for a long period of time in small doses, it is said to cause some salivation and looseness of the teeth. Nitric acid coagulates albumin.

Poisoning.—When nitric acid is taken in concentrated form it produces a widespread gastro-enteritis, great pain in the mouth, œsophagus, and abdomen, and finally death, from the inflammation induced or from collapse. If the patient survives the acute stages, he may die from secondary changes in the stomach and bowels, such as stricture or destruction of the peptic tubules. The stain made by the acid about the mouth and clothes is deep lemon-yellow. Renal irritation is often a severe symptom, and the passages from the bowels and the urine may be bloody.

The antidotes are any alkali of a mild type, as magnesium, chalk, or whitewash from the walls of the room, the use of oils and opium to relieve irritation, and the proper maintenance of bodily heat.

Therapeutics.—Nitric acid is used externally in medicine as a caustic for *chancres* and *chancroids*, the surrounding tissues being protected by oils or ointments.

It may also be used on *warts*, in cases of *gangrene* to destroy the tissues, and on *phagedenic ulcers*. Whenever the acid is to be applied for such purposes, a solution of soap and water should be at hand to neutralize its effects as soon as it has acted deeply enough. Nitric acid is also used externally in a dilute form, 5 to 30 drops (0.35–0.65) to the ounce, as a stimulant and astringent to *indolent ulcers.*

Internally, nitric acid is used as a tonic and astringent. In the *oxalic-acid diathesis* when oxaluria is present, nitric acid will give relief when nitro-muriatic acid cannot be obtained, although the latter is far preferable. When *small ulcers* exist in the mouth or *stomatitis* is present, 3 drops (0.25) of nitric acid at a dose, in water, will often be of service, but it should be taken through a tube to protect the teeth. In *gastric indigestion* in which, soon after a meal, sour food regurgitates into the mouth, a few drops of nitric acid will often give relief. In *intestinal dyspepsia* coming on some hours after meals, and in which not only discomfort but pain may be felt in the hypochondrium, nitric acid with some simple bitter tonic is most efficient, and it will often cure the *green diarrhœa* of children, particularly in the summer, bringing about these changes not only by its astringent power, but also by its stimulating effect on the intestinal glands. Combined with some good pepsin, it will give relief in the *chronic diarrhœa* of children associated with *lientery*, and in which the stools may be pasty or watery and at the same time ill-smelling.

Ringer recommends the employment of nitric acid in the treatment of *piles.* The strong acid should be used, and simply touched to one or two points, not swept over the whole surface. The pain is very slight, or none at all may be felt. A slough results, and finally comes away, leaving a cicatrix which as it contracts diminishes the size of the pile.

The same author also states that a lotion of dilute nitric acid in the proportion of ½ to 1 drachm (2.0–4.0) to a pint (500 cc.) of water is of service in *bleeding hemorrhoids*, arresting the bleeding, constringing the parts, and relieving the sensation of weight and fulness so often a pressing symptom.

The dose of dilute nitric acid (*Acidum Nitricum Dilutum, U. S.* and *B. P.*) is 3 to 15 drops (0.25–1.0), well diluted, and taken through a tube to protect the teeth.

NITRITE OF POTASSIUM.

Nitrite of Potassium is a salt used largely in modern medicine to take the place of nitrite of amyl, but it possesses greater stability, and is, therefore, more permanent in its effects. It is used for the relief of *angina pectoris* or *heart-pang*, in the treatment of *gastralgia*, and even in *epilepsy.* The dose is from 3 to 5 grains (0.25–0.3), although much larger doses have been employed. These larger doses are, however, not devoid of danger. Nitrite of potassium is eliminated by the lungs and by the kidneys as a nitrate. (See Nitro-glycerin.)

Cobalto-nitrite of Potassium.

This preparation has been suggested and tried successfully as a substitute for the nitrite of potassium. As it is a more stable compound, it is less rapidly broken up in the system, and so exercises a more prolonged influence. For this reason it does not act so vigorously or suddenly, which is a great advantage in some cases. Its use is identical with that of the rest of the nitrite group. The dose of cobalto-nitrite of potassium is ½ grain (0.03) every three hours.

NITRO-GLYCERIN.

Nitro-glycerin is a compound which, in its pure state, is used largely as an explosive, but it is employed in medicine in a dilute form as a useful drug in those instances where a somewhat rapid and powerful effect is to be exercised over the vascular system. Its physiological action is identical with that of the other nitrites, such as the amyl nitrite (which see), except that it is not so fugacious as the latter, nor so persistent in its effects as the nitrites of sodium and potassium. The dose is 1 to 2 drops (0.06–0.12) of a 1 per cent. solution in a little water or in a pill, and no more than this may be employed at one dose unless the patient takes the remedy for a considerable period of time, when as much as 60 drops may be administered. Often good results are only obtained by giving ascending doses. It is noteworthy that patients rapidly become immune to the drug, and Reading has recorded a case in which, after a year of treatment, 1 drachm (4.0) of 10 per cent. solution was taken daily with good effect. D. D. Stewart has also reported similar cases. The drug is largely employed in *angina pectoris*, and sometimes in *epilepsy* and *chorea* and in *gastralgia*. DaCosta and others have highly recommended this drug in the treatment of *chronic parenchymatous nephritis*, as it very distinctly decreases the escape of albumin from the kidneys. In *interstitial nephritis*, with cardiac disturbance resulting from the renal changes, in which there is a marked increase in arterial pressure, so that auscultation reveals at the second right costal cartilage an accentuated second sound due to the forcible closure of the aortic leaflets, nitro-glycerin often produces a good effect by reducing the pressure and relieving the heart of strain. When attacks of angina pectoris seem to be accompanied or preceded by marked vascular spasm, nitro-glycerin is also indicated. In cases of *asthma* dependent upon engorgement of the mucous membranes of the bronchial tubes it is very serviceable. Humphreys asserts that nitro-glycerin is a most valuable drug in *vomiting* of all kinds, except that of pregnancy and peritonitis. The solution used in medicine is too weak to be explosive. Tablets of nitro-glycerin (*Tabellæ Nitro-glycerini, B. P.*) each contain $\frac{1}{100}$ of a grain (0.0006). Nitro-glycerin is sometimes called trinitrine or glonoin. The U. S. P. of 1890 has introduced a *Spiritus Glonoini*, which is an alcoholic solution of glonoin. It should be kept in tightly-stoppered tins, never in glass, and be stored in a cool place, away from heat. Its explosiveness is in direct ratio to the evaporation of its alcohol. The dose of the spirit is the same as that of the watery solution—namely, 1 to 2 drops (0.05–0.1). The watery solution is not explosive.

NITRO-HYDROCHLORIC ACID.

Nitro hydrochloric Acid (*Acidum Nitro-hydrochloricum, U. S.*) is a liquid giving off a distinct odor, and possessed of a very caustic power, staining the tissues of the body a light yellow. It is official in the form of the dilute acid (*Acidum Nitro-hydrochloricum Dilutum, U. S.* and *B. P.*), in which form it is useless except as an ordinary acid. When we wish to use the acid for its own peculiar effects, the official dilute acid ought always to be supplanted by the freshly-mixed strong acid and be of an orange color. If this cannot be obtained, the physician should prepare the compound for himself by adding 4 parts of medicinally pure nitric acid to 16 parts of hydrochloric acid, and allowing the mixture to stand in an open bottle until the fumes are no longer given off in excess, when it must be tightly corked and kept in a dark place. This acid ought to be freshly prepared every few days.

Poisoning. The symptoms caused by poisonous doses are those of violent gastro-enteritis with vomiting and purging of bloody materials. Death may occur from perforation of the alimentary canal, from inflammation of the abdominal viscera, and from destruction of the peptic tubules, or constrictions of the œsophagus or bowel. The treatment consists in the use of alkalies, such as magnesium, lime, whitewash, soap and oils, with opium to allay irritation. The use of external heat to prevent collapse is also to be resorted to.

Therapeutics. Nitro-hydrochloric acid is an invaluable remedy in many cases of *indigestion* arising either in the stomach or bowels, as it acts as a tonic and stimulant to secretion. Upon the biliary flow its action is quite marked, and it may even cause bilious purging if administered in full doses for some days. It is therefore largely used in [illegible], either acute or chronic, and in the early stages of [illegible] should always be resorted to. In the *chronic hepatitis* [illegible] it is exceedingly useful, but it is not to be employed in [illegible] hepatitis, as it is a stimulant to the liver, which, under [illegible] needs quieting. When used in *chronic hepatitis* it [illegible] given in full dose and pushed to its physiological limit, as [illegible] by the bilious purging produced or by signs of gastro-intes-[illegible]

A[illegible] additional means for obtaining the beneficial effects of [illegible] it by means of the foot-bath or general bath. As [illegible] in India, the acid for this bath is prepared by slowly [illegible] together 2 parts of nitric acid, 3 parts of hydro-[illegible] after twenty minutes mixing carefully with these dis-[illegible]. For the general bath (in a wooden tub) take 5 [illegible] fluidounces (2 litres [illegible]) of the acid mixture, and [illegible] water to raise the temperature to 98°. Keep the [illegible] twenty minutes. Then rub him thoroughly with [illegible] place him in a dry, warm bed. For the foot-bath [illegible] of the acid to 2 gallons (7 litres) of water at [illegible] thighs and calves of the legs for twenty minutes [illegible] the mixture. This is a very useful treatment, according to Stillé, for cases of *alcoholic hepatic torpor*. If in either case the skin becomes irritated less acid is to be used.

In ordinary so-called *biliousness*, which is not biliousness, but intestinal indigestion, this acid is often of great service. (See Indigestion and Biliousness.) It is also of value in *dysenteric diarrhœa* where the dysentery rests upon defective secretory action on the part of the glands which pour out the proper fluids for digestion.

Another very important action of nitrohydrochloric acid is the remedial influence it exerts in cases suffering from *oxaluria*, particularly if this be associated with melancholia or great depression of spirits.

Administration.—The strong freshly-mixed acid should be given to the adult in the dose of 1 to 3 drops (0.05–0.18) three times a day, well diluted, and taken through a tube, after meals. If the patient is intelligent, he should be ordered ½ ounce (16.0) of the pure acid and told how to drop it. If he is not, the physician must order it partly or entirely diluted in the prescription, and in so small an amount that it may be renewed before it loses any of its power. Warning should be given of its effects on any clothes with which it may come in contact, and care should be taken that the bottle is held some distance away from the face when the cork is withdrawn, as the acid, if it is fresh, may spurt out and burn the eyes and face.

NITROUS OXIDE.

Nitrous oxide or nitrogen monoxide is sometimes called protoxide of nitrogen or "laughing gas." Its power of relieving pain was first recognized by Sir Humphrey Davy just one hundred years ago. As with ether, so with nitrous oxide, its first use as a surgical anæsthetic was by an American, Horace Wells, a dentist.

This gas is obtained by a complicated process which requires the use of such cumbersome apparatus that its manufacture is out of the question for the ordinary practitioner of medicine, while the fact that several large firms prepare the gas and sell it in cylinders ready for use renders its preparation on a small scale unnecessary. The gas is devoid of odor, but possesses a slightly sweet taste. It may be kept in gaseous form or liquefied and allowed to become gaseous as it is used.

Physiological Action.—Owing to the symptoms sometimes produced in patients inhaling this gas, it has received the popular name of "laughing gas," but a condition of hilarity is rarely seen when the inhalations are full and deep, and only comes on in the majority of cases where the gas is taken in small amounts or very slowly. When used properly, the patient is directed to take long, deep inspirations from the tube placed in the mouth, the nose being held so that the nostrils are closed. Under these circumstances the face becomes for a moment flushed, then of a deadly pallor, and finally the jaw drops if the effect is very great. At this time anæsthesia is complete and the operation is to be rapidly performed. Owing to the fact that when pure it is devoid of irritant properties, this gas can be used when ether and chloroform are contraindicated.

According to the most recent studies upon this gas (Wood and

Cerna), it causes at first a rise of arterial pressure, followed by a fall if the asphyxia caused by its inhalation is very severe. The anæsthesia may be due in part to the non-oxygenation of the blood during the time the gas is in this fluid, but the gas produces anæsthesia aside from any such influence. It has been thought that the use of this drug produces temporary glycosuria, but recent studies render this doubtful, to say the least. Where permanent glycosuria has been produced, some injury to the vascular system in the region of the diabetic centre in the floor of the fourth ventricle has in all probability occurred. The gas ought not to be given to those who are advanced in years or have atheromatous blood-vessels, since the rise of arterial pressure consequent upon the asphyxia may rupture a cerebral blood-vessel and thereby cause an apoplexy. Nitrous oxide gas when inhaled very rarely produces any disagreeable after-effects, save a little light-headed sensation or dizziness for a few hours.

Therapeutics.—Nitrous oxide is a useful anæsthetic in all minor operations, such as opening an abscess, boil, or felon, or even amputating a thumb. It possesses two disadvantages, the first of which is its brevity of action, since its continued administration is dangerous; the other, the difficulty in carrying it about from place to place. It possesses a great advantage in almost absolute safety, very few deaths having been caused by it directly. It is the safest of all anæsthetics, not even excepting cocaine, which latter drug has largely supplanted the gas for many minor surgical operations. When teeth are to be extracted, a plug or cork is placed between the jaws before the gas is given, to keep them apart. Under these circumstances the cork should always be attached to a string, so that if it slips into the back part of the mouth it may be withdrawn before it chokes the patient to death.

Oxygen gas may be combined with nitrous oxide gas with as great advantage as with the vapor of ether or chloroform, although its use may delay to a slight extent the development of anæsthesia. The following classes of persons, according to Hewitt, do better with the mixture of oxygen and nitrous oxide than with the nitrous oxide alone: 1. Children (who with nitrous oxide alone are liable to inconvenient jactitation); 2. Anæmic and debilitated patients, who, like children, quickly exhibit muscular contractions, and, in addition to this, remain but a very short time under the influence of nitrous oxide alone; 3. Any one who has previously exhibited great susceptibility to nitrous oxide *per se* (such patients are difficult subjects to manage in dental practice because of the short period of available anæsthesia); 4. Patients who, under nitrous oxide alone, have experienced highly unpleasant sensations; 5. Patients very advanced in years; 6. Patients with very large tonsils; 7. Patients suffering from heart or lung affections.

NUCLEIN.

The animal body has several methods of protecting itself from the attacks of infecting micro-organisms. One of these is by phagocytosis, or the devouring of the germs by the cells of the body; the other is by the protective or germicidal influence of the blood-serum. It has been proved that the latter power depends upon the presence in the blood of certain proteid-like bodies rich in phosphorus, which can also be derived from cell-nuclei and other sources, such as yeast-cells and many animal tissues. Nuclein is a weakly acid body composed of nucleic acid and some form of proteid matter, and it not only increases the germicidal power of the blood-serum when it is given to man or one of the lower animals, but in addition it causes a great increase of leucocytosis, which of course aids in phagocytosis and probably results in the production of still more nuclein from the leucocytes.

Nuclein, as placed upon the market, is manufactured, as a rule, from yeast. It is prepared in many different ways and much of it is unreliable and possesses none of the characteristics of true nuclein. Very recently Chittenden of Yale University has analyzed the various nuclein preparations on the market; and he finds a preparation called "nuclein standard" to contain no phosphorus, and, as phosphorus is a prominent constituent of nuclein, he says it "seems obvious that the solution contains no nuclein." "Protonuclein," another preparation of this character, contained 1.25 per cent. of phosphorus, and therefore contains in all probability nuclein, and the improved nuclein solution of Parke, Davis & Co., which is a 1 per cent. solution of pure nucleinic acid from yeast, contained 6 per cent. of phosphorus, "which would imply the presence of even more than 1 per cent. of such a nucleic acid" (Chittenden). It is evident, therefore, that this preparation of nuclein is a good one to use in testing this new method of treatment.

Therapeutics.—Nuclein is used with asserted great success in the treatment of the ordinary forms of pulmonary tuberculosis and for septicæmia. Theoretically it should prove useful in combating any infectious process.

Administration.—The proper way to use the nuclein solution just named is to give 10 to 60 minims (0.65–4.0) hypodermically once, twice, or thrice a day with careful antiseptic precautions, or to give a teaspoonful (4.0) in a wineglassful of water on an empty stomach thrice during the day and at bed-time.

Contraindications.—The nucleins should not be given for a long period of time to gouty persons; these patients usually have uric-acid troubles under their use, as nuclein is an antecedent of uric acid.

NUTMEG.

Myristica, *U. S.* and *B. P.*, or Nutmeg, is the kernel of the seed of *Myristica fragrans*, an East and West Indian plant, mace being the outside covering of the same. Nutmeg is a soporific and nervous sedative, exercising a peculiar influence over the cerebrum. It is also used as a flavoring substance in somnifacient mixtures, and is of value in prescriptions for *serous diarrhœa*. The oil (*Oleum Myristicæ*, *U. S.* and *B. P.*) is given in the dose of 1 to 3 drops (0.05–0.15). The spirit or essence (*Spiritus Myristicæ*, *U. S.* and *B. P.*) is used in the dose of 1 to 2 fluidrachms (4.0–8.0).

Several cases of poisoning by nutmeg are reported, the most recent by Dr. Reading of Woodbury, N. J. The symptoms closely resemble those produced by excessive doses of cannabis indica.

NUX VOMICA.

Nux Vomica (*U. S.* and *B. P.*) is the seeds or beans of the *Strychnos Nux-vomica*, an East Indian tree. It contains two alkaloids, strychnine and brucine, and depends largely for its medicinal power on the former. For this reason the statements made in regard to the physiological action of strychnine may practically be considered as applicable to the entire drug.

Physiological Action.—When strychnine is given to man or the lower animals in full medicinal dose it increases reflex activity, respiratory rate, pulse-force, arterial pressure, the acuity of vision and hearing, and causes general systemic irritation or excitement.

NERVOUS SYSTEM.—On the nervous system strychnine exerts its chief influence. It excites the spinal cord in its motor tracts, and probably increases the receptive activity of the sensory centres. It also has some slight influence in increasing the conductive power of the motor and sensory nerves.

In overdose strychnine produces spinal or tetanic convulsions by an action exerted on the spinal cord. When enormous doses are given intravenously, total paralysis, resembling that caused by curare, precedes the convulsions, and if artificial respiration is not used the animal dies from failure of respiration. If death takes place from the effects of the drug, the motor nerves are found to be depressed, partly as the result of the poisonous action of the strychnine, and partly as the result of the exhaustion of the nerve-trunks by the convulsing impulses which they have carried.

CIRCULATION.—Nux vomica increases the force of the pulse-beat and the pulse-rate by a stimulation of the heart-muscle and its ganglia, while the rise of arterial pressure which it causes is due to stimulation of the vasomotor centre. If very poisonous doses are injected intravenously, a fall of arterial pressure occurs instead of a rise, which is due to vasomotor depression and paralysis.

RESPIRATION.—Strychnine is one of the most constant and powerful stimulants to the respiratory centre that we have, and it not only increases the rate, but the respiratory capacity.

TEMPERATURE.—Ordinary doses have no effect upon temperature, but poisonous doses may raise it by reason of the convulsions.

ELIMINATION.—Strychnine is eliminated from the body by the

as strychnine and strychnic acid. Most of it is oxidized and

by the liver.

—When a poisonous dose of strychnine is taken, it acts

or gradually. If suddenly, the man or animal may

premonition, thrown several feet and becomes rigid

his muscles.

attac gradual, some stiffness at the back of the neck and

or the he general nerve-storm. The convulsions are tetanic, or, in other words, tonic, and the body is thrown into opisthotonos; that is, resting on the head and heels at each convulsion.

Sometimes the trunk is twisted sidewise or the flexion of the body is forward (emprosthotonos). The eyes are open and fixed, the corners of the mouth drawn back into *risus sardonicus*, and respiration during a severe convulsion is impossible, owing to the respiratory muscles being in a state of tetanic rigidity.

The slightest noise, draught of air, or touch may cause a convulsion or convulsion after convulsion, because the sensory impulse, reaching the spinal cord, causes a spasmodic motor impulse to be sent out to the muscles.

The convulsions are not absolutely continuous, but periods of utter or partial relaxation occur, during which the patient breathes easily. The cramp-like contractions of the muscles are exceedingly painful, and the patient either dies of cramp asphyxia—that is, through failure of respiration because his chest-muscles are locked in spasm—or, much more rarely, from exhaustion. Reichert has shown that it requires five hundred times the ordinary fatal dose of strychnine to cause death in animals if artificial respiration is properly maintained.

Treatment of Poisoning.—The attendant should give at once, if no symptoms have yet appeared, inhalations of nitrite of amyl, and meanwhile employ the stomach-pump, using the nitrite to prevent any convulsive tendencies during the operation. Draughts of water containing tannic acid, as the chemical antidote, are to be administered, and after the stomach is washed out 60 grains (4.0) of bromide of potassium and 20 grains (1.3) of chloral in solution are to be given. These are the physiological antidotes, for the bromide of potassium depresses the sensory tracts of the spinal cord, and the chloral depresses the motor tracts. If the convulsions prevent swallowing, the patient must be chloroformed with care, and the physiological antidotes given in starch-water by the rectum, muscular relaxation being maintained by the anæsthetic until the drugs are absorbed. Ether cannot be used as a relaxant, as it is too irritant and too slow. Nitrite of amyl is a physiological antidote, but it is useless if a complete convulsive attack is present, as it cannot be inhaled if the chest is immovable. Neither can any other relaxant, such as chloroform, be used under these circumstances. These drugs should be gently given between the paroxysms. If relaxation does not occur, the nitrite of amyl should be injected hypodermically.

While a light touch may produce a spasm, a firm, hard grasp of the limb often relieves the pain of the cramp. Sensation and consciousness are preserved in strychnine poisoning unless the asphyxia destroys them.

Differential Diagnosis.—The convulsions of strychnine poisoning do not resemble epilepsy, because they are so distinctly tonic and never clonic. From tetanus strychnine poisoning is to be separated by the fact that in tetanus the locking of the jaws comes first, while in strychnine poisoning it comes last. The convulsions of tetanus rarely, if ever, completely relax, while those of strychnine do have periods of relaxation. There is a different history in each case—in one perhaps of an injury, as of a nail run into the foot; in the other, of a dose of poison having been swallowed.

The differential diagnosis of strychnine poisoning from hysterical convulsions is more difficult. The convulsions are rarely so persistently tonic in hysteria, and the peculiar expression of the hysterical face is often seen in such cases. The history of the patient, if obtainable, will throw much light on the case and aid very materially in the separation of the two conditions, while the peculiar variations in cutaneous sensibility, such as areas of hyperæsthesia and anæsthesia, which are so characteristic of hysteria, may render the diagnosis possible.

As the treatment of all these states is virtually identical, the employment of the measures just suggested may be resorted to in each instance, and the diagnosis made afterward.

Therapeutics.—Nux vomica, or its chief alkaloid strychnine, is used for several purposes in medicine. Owing to its bitter characteristics it may be employed as a simple bitter tonic or as one especially influencing the nervous system. It may also be used as a respiratory, cardiac, and ocular stimulant.

In cases of *functional nervous atony*, or depression, strychnine does good, but in organic disease, if used during the period of acute inflammation, as after an apoplexy or in acute infantile palsy, it is distinctly harmful. Some persons who have suffered from apoplexy can never take the drug without a spasm coming on in the paralyzed part or parts. In acute or subacute neuritis strychnine ought never to be used in any way whatever, as the nerves are already inflamed, and are not to be still further irritated by the employment of nervous excitants. In *progressive lead palsy* large doses of strychnine should be constantly used to stop the progress of the disease, iodide of potassium also being employed to cause the elimination of the lead.

In *amaurosis* dependent upon the excessive use of tobacco or alcohol strychnine is almost a specific, and in eye-strain resulting from insufficiency of the ocular muscles it does great good, curing the insufficiency and improving the general condition of the muscles. According to de Schweinitz, the patient should use ascending doses of the tincture of nux vomica, beginning with 3 drops (0.15) three times a day, and increase the amount 2 drops (0.1) a day until distinct physiological effects are produced. Sometimes 60 drops (4.0) may be taken in twenty-four hours after tolerance is reached.

In *pneumonia* and all other acute diseases in which sudden collapse is liable to occur strychnine is of the greatest service at the time of need. Often it will pull the patient out of a sinking attack which seems certain to end in death. It should be used freely by the hypodermic needle, and is often aided in producing its good effects by the addition of $\frac{1}{150}$ to $\frac{1}{100}$ grain (0.0004–0.0006) of atropine to each injection. (See Pneumonia and Shock.)

There is no drug known which is so antidotal to the effects of overdoses of chloroform as is strychnine. In cases of sudden accident, with arrest of the heart or respiration during the use of this anæsthetic the physician should give hypodermic injections of $\frac{1}{10}$ grain (0.006) of strychnine as a powerful, rapidly-acting cardiac and respiratory stimulant, which dose may be repeated in ten minutes if no effect is produced. Strychnine is a very valuable remedy in *surgical shock*, and is a better antidote to opium than is belladonna.

In *dyspnœa* from any cause, such as that of old persons suffering from *winter cough* or *bronchorrhœa*, in *emphysema*, *phthisis*, and in *shortness* of breath, strychnine is of service, and it is a valuable drug for the treatment of opium-poisoning, because it preserves the reflexes and stimulates the respiratory centre.

In *atony of the bowels* strychnine is of service, and it is to be added to purgative pills to avoid their depressing after-effect on the intestines.

In cases in which a lesion exists in the brain, strychnine may be used to keep up the nutrition of a limb which is paralyzed, but if the palsy be due to disease of the trophic cells in the spinal cord, it does little good except to stimulate the remaining cells to greater effort.

According to Ringer, *sick headaches*, due to errors in diet and without much nausea, can be put aside for the day by the use of 1 drop (0.05) of the tincture of nux vomica in a teaspoonful (4.0) of water every five or ten minutes until 10 drops (0.65) are taken.

Untoward Effects.—Care should be exercised in giving strychnine to children, as they are more susceptible to the drug than are adults. The proper beginning dose of strychnine by the mouth for a child of five or six is not more than $\frac{1}{100}$ grain (0.0006). In some cases of exhausting disease the prolonged use of full doses of strychnine may produce a talkative delirium with great peevishness, and, if the drug is continued, this condition may pass into a state of temporary insanity. Brunton asserts that nux vomica may induce malarial chills in those predisposed to them. He also asserts that strychnine acts more powerfully when given by the rectum than by the mouth. This is doubtful.

Administration.—The extract of nux vomica (*Extractum Nucis Vomicæ, U. S.* and *B. P.*) is given in the dose of $\frac{1}{6}$ to $\frac{1}{4}$ of a grain (0.01–0.016); the fluid extract (*Extractum Nucis Vomicæ Fluidum, U. S.*), in the dose of 1 to 5 drops (0.05–0.3); the tincture (*Tinctura Nucis Vomicæ, U. S.* and *B. P.*), in the dose of 5 to 30 drops (0.3–2.0). *Strychninæ Sulphas, U. S.* and *B. P.*, is given hypodermically in the dose of $\frac{1}{30}$ to $\frac{1}{20}$ of a grain (0.002–0.003), and by the mouth in the same amounts. In cases of severe surgical shock as much as $\frac{1}{4}$ grain (0.016) may be used hypodermically.

OPIUM.

Opium (*U. S.* and *B. P.*) is the juice or milky exudation appearing on the surface of the unripe capsules of white poppy or *Papaver somniferum*, a native plant of Asia, now grown in many other parts of the world.

Good opium, according to the *U. S. P.*, should contain at least 9 per cent. of crystalline morphine, but the powdered opium (*Pulvis

Opii, U. S.) should contain not less than 13 or more than 15 per cent. of morphine.

The chemical composition of this drug is very complex, no less than seventeen alkaloids having been obtained from it, the most important of which are morphine, codeine, narcotine, thebaine, narceine, papaverine, pseudomorphine, and laudanine. It also contains meconic acid and meconine.

Physiological Action.—The action of opium upon man and the lower animals varies with the degree of intelligence or cerebral development. It quiets the brain and excites the spinal cord.

NERVOUS SYSTEM.—The dominant action of opium upon man is to produce nervous sedation in small doses and sleep when given in larger amounts. Sometimes, however, in persons who are accustomed to its use, it produces a state of restless insomnia or quiet, wakeful apathy. When given to frogs it often produces tetanic convulsions, owing to its primary stimulant effect on the spinal cord. In dogs it increases the reflexes and produces drowsiness, and in man sleep. If, however, the patient be a member of one of the lower races or a young child, the spinal irritation may be as manifest as the cerebral sedation. If large doses are given, sleep is produced in all animals, and both the brain and spinal cord are depressed. The sensory nerves are also markedly benumbed, and the motor nerves may finally be rendered inactive.

CIRCULATION.—Small therapeutic doses of opium have no effect upon the circulation, but large ones slow the pulse, increase its force, and slightly raise arterial pressure.

The slowing of the pulse depends upon stimulation of the pneumogastric nerves peripherally and centrically; the increase in pulse-force rests upon the stimulation of the heart-muscle and its ganglia; the rise of pressure is due chiefly to the increased heart-action.

After poisonous doses the pulse becomes rapid and feeble, due to depression of the vasomotor centre and the heart, and the gradually increasing asphyxia.

RESPIRATION.—In very minute doses opium is a feeble stimulant, or at least not a depressant, to the function of respiration. In overdose it is one of the most powerful paralyzants of the respiratory centres in the medulla oblongata, causing death by this action.

TEMPERATURE.—The bodily temperature is raised slightly by full doses and lowered by poisonous amounts of opium.

TISSUE-WASTE.—Opium acts as a preventive to tissue-waste, increasing the elimination of urea and other results of nitrogenous breakdown.

ELIMINATION.—The drug escapes from the body, if given in excess, as morphine, by way of the intestines and kidneys, but most of it is destroyed by oxidation in the liver and tissues. Experiments made by Alt and Tauber show that morphine is chiefly eliminated by the stomach, and that if this viscus is frequently washed out during a case of poisoning, recovery is much aided, as by this means reabsorption is prevented.

PUPIL.—Opium contracts the pupils by a centric stimulation of the oculo-motor nerves, and perhaps by depression of the sympathetic fibres.

STOMACH, INTESTINES, AND SECRETION.—Opium depresses the motor activity of the stomach and intestines and produces constipation. It does this by stimulating the splanchnic inhibitory fibres of the intestine and thereby preventing peristalsis. In very large doses it increases peristalsis by paralyzing these fibres.

Opium checks every secretion in the body except that of the skin.

Acute Poisoning.—When opium is taken by man in overdose it causes drowsiness, deep sleep, full breathing, a slow, full pulse, a warm, dry skin, contracted pupils, and pleasant—or, more commonly, in the Anglo-Saxon race, disagreeable—dreams or no dreams at all.

Preceding this period there may be a brief one during which the person feels self-satisfied and contented. The duration of this agreeable sensation only lasts a short time, and if the dose is large does not occur or at once passes off. It has been called the first stage, while the more marked symptoms just described have been grouped into a so-called second stage.

During the sleep of the second stage the patient can be roused by shouting in his ear or by violent shaking, but sinks back into slumber at once on being left alone.

The face is suffused and reddened, and may be finally distinctly cyanotic. Many of the symptoms resemble those of congestion of the brain. The breathing may be puffing and stertorous. When the patient is awakened he breathes more rapidly, and for this reason the duskiness of the face disappears and the normal hue returns. Death never occurs in the second stage of opium poisoning from the poison alone, but if a complicating disease is present death may take place at this time.

The third or fatal stage emerges from the second by a process so gradual that no abrupt line of separation can be noted. The face becomes at first more cyanotic, then pale and livid; the respirations, which have been eight to ten to the minute, are now only four or five, and finally such prolonged pauses occur that all hope of another respiration is lost by the attendant. While the slow breathing is at first deep, it now rapidly becomes shallow, and muscular relaxation is present to the greatest degree. The skin, previously dry, is wet with the sweat of death, the patient is so deeply narcotized that nothing can arouse him, and he dies from respiratory failure, although the heart ceases almost simultaneously from the asphyxia. The pupils do not dilate in the third stage, except in the relaxation of death.

TREATMENT OF ACUTE POISONING.—After employing the usual methods resorted to for the purpose of unloading the stomach, and after giving permanganate of potassium or tannic acid, preferably the former, as the chemical antidote, the patient should receive one or two cups of strong black coffee, hot and concentrated. The heat in the liquid is useful in maintaining bodily temperature, and the caffeine stimulates the respiratory centre and keeps the man awake. Coffee should be used even before any symptoms come on, in order to put them off if possible. If strychnine is at hand and the respirations are becoming very slow, $\frac{1}{30}$ to $\frac{1}{10}$ of a grain (0.003–0.006) should be given hypodermically. Strychnine is much better than atropine as an antidote to opium, and should be given hypodermically in full dose, repeated frequently enough to keep the nervous system of the patient active and respiration intact. The pupil is no guide as to the action of atropine in opium poisoning, as the action of these two drugs (opium and atropine) on the eye is not directly antagonistic.

Alcoholic stimulants may be called for, and ammonia as a cardiac and respiratory stimulant may be resorted to.

In the third stage heat should be applied to the trunk and extremities.

Much emphasis has been placed on keeping the patient awake, and it has been thought that the cause of death was the deep sleep. This is not so. The man must be kept awake in order that he will supplement the efforts of his depressed respiratory centres by voluntary breathing. If he sleeps, he forgets to breathe, and sleep means death for this reason, and not because sleep in itself produces death.

Besides the use of the hot strong coffee, the patient may be kept awake by lashing him with switches or by keeping him walking up and down between two attendants. Both of these measures are reprehensible if anything better can be done—the first method because it covers the patient with cuts and bruises, the second because it may aid in the production of death by exhaustion. If an ordinary medical faradic battery is at hand, the full force of the current may be allowed to come in contact with the skin from two small poles wet with salt water, or, better still, the dry or wire electric brush should be swept over the body while the negative pole is held in the hand of the patient or pressed against his skin. This causes the most exquisite pain in the normal individual, but if the brush is kept moving will not cause any bruises or discoloration. (See Asphyxia.) Artificial respiration may be resorted to.

As already pointed out when discussing the elimination of opium, the dose is eliminated into the stomach from the blood-vessels and then reabsorbed. Frequent washing out of the stomach is therefore advisable in treating cases of poisoning.

Chronic Poisoning.—Morphine or opium when taken constantly generates a habit. The person—or morphine-habitué, as he is sometimes called—depends for a comfortable existence on the drug, and day by day increases his dose until the most extraordinary amounts are taken by the stomach or by means of the hypodermic needle. If the drug is withheld, a train of symptoms typifying depression or exhaustion ensues. The pulse is scarcely to be felt, horrible mental depression and melancholia come on, the miserable man or woman wrings his or her hands, and begs, screams, howls, or yells for morphine, only to break down and cry on being refused the customary dose. Diarrhœa of a serous type and most violent in character, with cramps in the muscles, may assert itself, and must be controlled by astringents and an active line of treatment as far as possible free from opium. (See Diarrhœa.)

A characteristic symptom of chronic opium-eating is the development of the most remarkable and clever lying in previously truthful persons. In the same breath that the patient begs the physician to cure him, and not give him another dose of morphine, he will lie to obtain the drug in a surreptitious manner, and may even have the drug in his mouth at the moment he speaks. It will often be found hidden in the seams of the clothing in small packages, and the nurse must be absolutely reliable, above bribery, and for ever on the watch lest the drug be obtained by smuggling. Any sudden improvement on the part of the patient should be placed to the credit of more morphine, not to professional skill.

TREATMENT.—The best way to treat such cases is to "taper off" the daily dose, and to decrease by a sixth or a fourth the total customary amount in each twenty-four hours. The sudden complete withdrawal of the drug is an unnecessarily severe measure, and its withdrawal in a slower manner than that named is simply prolonging the treatment beyond reasonable limits. Cocaine has been used to tide over the crisis after the withdrawal of morphine, but too frequently the patient passes from opium to the cocaine, and finally to the alcohol habit, all of which are equally bad. If the circulation flags, digitalis and strychnine may be given and the remaining symptoms treated as common sense indicates.

Sometimes paregoric is taken in excess, and the writer has seen and treated a case in which over a pint of paregoric was taken every day.

When a mother is an opium-eater, the new-born child often suffers from collapse on the second or third day after its birth, owing to the lack of its customary dose of opium.

Therapeutics.—Opium is used for relief of five great conditions, which will be spoken of *seriatim*, the minor uses of the drug being considered afterward. These are pain, insomnia, inflammation and irritation, over-secretion, and systemic strain.

PAIN.—Opium, as is known to every one, is the best remedy that we possess for the relief of all forms of *pain*, except in those instances where *neuralgia* exists, when antipyrin and its fellow-compounds exceed it in medicinal value because they have no marked after-effects. In one form of pain opium is not to be employed—namely, that arising from *cerebral congestion* and *cerebritis*, for it is distinctly contraindicated in these affections, as it makes them worse. In acute or traumatic *meningitis*, however, opium is of great service, either alone or combined with mercury in sthenic cases. In the treatment of cases of *renal* and *hepatic colic* associated with spasm, and in *dysmenorrhœa*, belladonna and opium given together will relieve the spasm and pain, and yet so counteract each other elsewhere in the body as to be devoid of effect upon other organs. Persons suffering from pain will always bear very much larger amounts of opium than painless individuals.

INSOMNIA.—Opium, while capable of producing sleep in almost every case in which it is given, save in those persons who by reason of idiosyncrasy are made wakeful by it, is only to be used in those instances where the sleeplessness is due to pain. If constantly used for the relief of insomnia or pain, the opium habit is rapidly contracted, and for this reason the use of this drug should be alternated with chloral, cannabis indica, and other soporific drugs.

In some cases chloral and morphine, when given in small doses in combination, will so act upon the brain as to produce sleep.

Thus, in the following prescription, the dose of both active ingredients is much smaller than would be needed if either one was used alone, yet the result sought by their use—namely, sleep—is readily produced:

℞.—Morphinæ sulph.	gr. ij (0.10).
Chloralis	ʒj (4.0).
Syrupi	f℥j (32.0).
Aquæ dest.	q. s. f℥ij (64.0).—M.

S.—Dessertspoonful (8.0) at nine P. M., and, if needed, again at ten or eleven o'clock.

In the *insomnia of typhoid fever* opium may be used, particularly during convalescence, but it must be employed most carefully.

INFLAMMATION AND IRRITATION.—Opium seems to possess some influence over inflammation which we cannot explain, and both small and large doses are particularly valuable in inflammation of serous membranes, such as *peritonitis*, *meningitis*, and *pericarditis*. It allays the nervous excitement and anxiety following *hæmoptysis*, and the intense unrest caused by *itching skin diseases*, as, for example, the *irritation of small-pox.*

Sometimes intense irritation or inflammation produces so great an effect upon unstriped muscular fibres as to cause spasm or paralysis, as in *retention of urine*, *cystitis*, or the constipation following inflammation of the bowels due to the ingestion of irritating foods; under these circumstances the employment of opium is indicated, and is usually very successful. In *irritative coughs* morphine given in syrup of wild-cherry bark does good in the dose of $\frac{1}{12}$ to $\frac{1}{10}$ of a grain (0.005).

Opium is often used, or its alkaloid morphine, to allay nervous excitement and cough in cases of *hæmoptysis.*

In some cases of *irritable cough*, due to a tickling sensation in the larynx much relief can be had by inhaling the steam arising from a cup of boiling water in which has been placed a drachm or two of paregoric.

Whenever a *cough* is in excess—that is, greater than is necessary to free the lung from mucus—morphine may be given in small doses. If the lungs contain more râles after its use than before, its use must be stopped, as the increase in the number of râles indicates an increase in the accumulation of mucus.

In the treatment of *strangury* due to *cystitis*, and in *rectal inflammation*, provided they are not acute, and after operation on the pelvic organs, suppositories of the strength of $\frac{1}{4}$ or $\frac{1}{2}$ of a grain (0.016–0.03) of the watery extract of opium are very useful. In *excessive vomiting* from any cause, except it be from a previous dose of opium, an enema of deodorized laudanum 30 drops (2.0) and starch-water 4 ounces (128.0), with 20 grains (1.3) of bromide of sodium, will be found of value. (See Vomiting, Part IV.)

For *sprains* and *bruises* lead-water-and-laudanum is one of the best applications. (See Article on Lead.) If the skin is broken, the laudanum may be used alone to relieve pain, and, by its alcohol, will act as an antiseptic. Opium is also a useful drug in the treatment of internal and external *burns* to relieve the pain and irritation.

OVER-SECRETION.—In *serous diarrhœa, diabetes insipidus*, and *mellitus*, and in the treatment of over-secretion on the part of all secreting surfaces except the skin, opium may be used.

It is said to decrease the amount of urine before decreasing the amount of the sugar in diabetes. However this may be, the employment of morphine or codeine in diabetes is a very valuable form of treatment. The doses should be rapidly increased, as the effect is only obtained by ascending amounts, and diabetic patients seem peculiarly immune to the nervous influence of this drug and its alkaloids. Morphine is, therapeutically, the more powerful of the two alkaloids. Neither of them, probably, cures the disease, but so modifies it as to make life bearable and happy. (See article on Diabetes, Part IV.)

Opium should not be used to arrest an attack of *mucous diarrhœa* until after the mucus, which is already present in the bowel, has been swept out of the intestinal canal by a dose of castor oil or magnesium sulphate. Minute doses of $\frac{1}{80}$ to $\frac{1}{50}$ of a grain (0.001) of morphine will sometimes check *summer diarrhœa* in children at once when given hypodermically. (See article on Diarrhœa.)

Morphine is used to relieve pain rather than opium, because it does not cause so much constipation, but opium is better to check diarrhœa. Paregoric is particularly useful in diarrhœa because it contains a volatile oil and camphor.

SYSTEMIC STRAIN.—In prolonged strain upon the system, as in great physical or nervous effort, or more frequently in *old age* to smooth out the cares of the remaining years of life and decrease worry, opium is useful, but its use in young persons is most dangerous, as it is almost certain to produce the opium habit. In *asthenic fevers* opium is thought to be supportive, but its use is apt to cause so many other conditions, such as constipation, anorexia, or mental depression, that alcohol is much better for this purpose. In very advanced *phthisis* it is often justifiable to give enough opium to keep the patient free from pain and discomfort for the remaining hours of his life, but care must be taken that the dose does not interfere with his breathing and so hasten death.

In *muscular rheumatism* and similar states, and when a "cold" has been taken, opium in the form of Dover's powder in the dose of 5 to 10 grains (0.31–0.65) will often produce a cure, particularly if employed in combination with hot drinks and a hot foot-bath. Camphor can often be added to the Dover's powder with advantage. (See Coryza, Part IV.)

In *heart disease*, particularly of the mitral valves, the patient can often breathe easily only when awake, starting up when he falls asleep and gasping for breath. It is stated by some writers that morphine will relieve this state and permit sleep, but that it will not be of service in aortic disease. While this may be partly true, the drug will often give great relief in all forms of *cardiac dyspnœa*, and ought always to be tried with caution, although it is contraindicated if the heart has undergone fatty degeneration. Care should be taken that the first dose is small, as in some instances it increases the discomfort. The relief obtained is supposed to be due to cardiac stimulation by the drug, and, while this is no doubt correct, the other cardiac stimulants, such as digitalis, will fail when morphine succeeds. The presence of cyanosis and lividity is said to be no contraindication to the hypodermic use of morphine under these circumstances, provided the dose is not unreasonably large. The drug should be given hypodermically for this purpose.

Administration.—Recent studies upon the action of opium and its alkaloids show that it acts in an inhibitory manner upon gastric digestion and absorption, decreasing the amount of hydrochloric acid in the gastric juice. For this reason, unless there is an excess of acid present in the stomach, it is well not to give opium or morphine at meal-times, but some time after.

Opium itself is used in the form of the powder (*Pulvis Opii, U. S.*) in the dose of from ¼ to 1 grain (0.016–0.05). The solid preparations are the deodorized opium (*Opium Deodoratum, U. S.*), which is deprived of its narcotine, dose ½ to 1 grain (0.03–0.05); the pills of opium (*Pilulæ Opii, U. S.*), each containing 1 grain (0.05); and the watery extract (*Extractum Opii, U. S.* and *B. P.*), dose ¼ to ½ a grain (0.016–0.03). Of the liquid preparations we have paregoric (*Tinctura Opii Camphorata, U. S.; Tinctura Camphoræ Composita, B. P.*), dose 1 drachm to 2 tablespoonfuls (4.0–32.0); laudanum (*Tinctura Opii, U. S.* and *B. P.*), dose 10 to 30 drops (0.65–2.0); the deodorized tincture (*Tinctura Opii Deodorati, U. S.*), dose 10 to 30 drops (0.65–2.0); the *Vinum Opii, U. S.* and *B. P.*—or, as it is sometimes called, Sydenham's Laudanum—dose 10 to 30 drops (0.65–2.0); and *Acetum Opii, U. S.*, or Black Drop, dose 10 to 30 drops (0.65–2.0).

As all the liquid preparations of opium are of 10 per cent. strength, except paregoric, which is about 2 grains to the ounce, the dose of all of them except paregoric is identical. This is a fact to be remembered by students.

Under the name of Dover's Powder (*Pulvis Ipecacuanhæ et Opii, U. S.*) a powder containing 1 grain (0.05) of powdered opium, 1 grain (0.05) of powdered ipecac, and 8 grains (0.50) of sugar of milk is largely used. This is more efficacious if separated into fifths and taken in divided doses. The tincture of ipecac and opium (*Tinctura Ipecacuanhæ et Opii, U. S.*) is given in the dose of 4 to 15 minims (0.3–1.0).

The preparations of opium official in the *B. P.*, other than those already named, are—*Confectio Opii*, dose 5 to 20 grains (0.3–1.3); *Extractum Opii Liquidum*, dose 4 to 20 minims (0.3–1.3); *Pulvis Opii Compositus*, composed of opium, pepper, ginger, caraway-fruit, and tragacanth, dose 2 to 5 grains (0.1–0.35); *Tinctura Opii Ammoniata*, dose ½ to 1 drachm (2.0–4.0); and *Trochisci Opii* ($\frac{1}{10}$ grain [0.006] of opium in each), dose one to four. *Pilula Saponis Composita, B. P.*, is purely a preparation of opium. It is sometimes necessary to give this drug to patients without their knowledge, and it may be prescribed in this way, the patient not learning from the prescription the nature of the medicine.

The *B. P.* also recognizes a liniment (*Linimentum Opii*) and a plaster (*Emplastrum Opii*) for local application, and an enema (*Enema Opii*), composed of ½ a drachm (2.0) of the tincture of opium and 2 ounces (64.0) of starch mucilage.

Untoward Effects.—When opium is given to some persons it produces for some hours marked wakefulness followed by sleep, and in many patients produces after its primary influence great nausea, and sometimes vomiting. The mental depression may be simply overwhelming, and the very fact of having to drag out existence is a curse. By far the most effective mode of preventing these very distressing effects of opium or its derivatives is to administer with this drug about $\frac{1}{200}$ grain of nitroglycerin. One of the chief causes, however, of the nausea produced by the use of opium or morphine is the change in the body of morphine into oxy-dimorphine, which is eliminated into the stomach and there reabsorbed, and then induces these secondary effects. It is also a fact that these symptoms can be largely done away with by the use of 20 grains (1.3) of bromide of potassium, which must be taken at the same time as the opiate, and by employing the preparations of opium largely devoid of narcotine, such as the deodorized tincture or deodorized opium itself. Whenever it is possible these preparations should be used to the exclusion of the others. Haig is responsible for the assertion that, as opium frees the blood of uric acid by causing its retention in the tissues of the body, the pleasant effects are so produced, and that, the retention being cumulative, no sooner does the effect of the opiate pass off than the uric acid is set free in the blood, and as a result depression ensues. He states that if salicylates are given with the opium the retention does not occur, and the unpleasant sequelæ are much modified or prevented. After the untoward symptoms come on coffee and stimulants may be used with advantage to overcome them. In some persons the use of opium is followed by the development of an erythematous rash which may go on to desquamation.

Children bear opium badly, and some children are very much more susceptible than others to its influence.

One-eighth grain of morphine has caused death in an adult when given hypodermically, probably because it entered a vein. Sometimes the drug causes collapse, or in other cases an eruption upon the skin of the body.

The use of repeated doses of morphine for several days often sets up obstinate vomiting, due probably to the change of the drug into oxy-dimorphine or apomorphine.

Codeine.

(See p. 159.)

Morphine.

Morphina, *U. S.* and *B. P.*, is the chief alkaloid of opium, but owing to its insolubility is rarely used, being generally given in the form of the sulphate.

Sulphate of Morphine (*Morphinæ Sulphas, U. S.* and *B. P.*) is given in the dose of $\frac{1}{8}$ to $\frac{1}{2}$ grain (0.008–0.03), either by the mouth or hypodermically. Besides the sulphate of morphine we have the acetate (*Morphinæ Acetas, U. S.* and *B. P.*) and the muriate (*Morphinæ Hydrochloras, U. S.* and *B. P.*), both given in the dose of $\frac{1}{8}$ to $\frac{1}{2}$ grain (0.008–0.03). In the U. S. Pharmacopœia of 1870 a solution of morphine (*Liquor Morphinæ Sulphatis, B. P.*), was official, dose 1 to 2 drachms (4.0–8.0), but it is no longer official and should not be called for. Magendie's solution of morphine is sixteen times as strong as this liquor just named (16 grains to the ounce), and is not official. The words "Liquor Morphinæ Sulphatis" will often cause Magendie's solution to be dispensed in New York State, and care should be taken that poisoning does not result. *Pulvis Morphinæ Compositus, U. S.*, or Tully's Powder, is given in the dose of 10 grains (0.65). It contains sulphate of morphine, camphor, licorice and precipitated calcium carbonate. It is used to break up forming colds and as a nervous sedative. Troches of morphine and ipecac (*Trochisci Morphinæ et Ipecacuanhæ, U. S.*) are given one or two at a time.

The following additional preparations of morphine are official in the *B. P.: Liquor Morphinæ Hydrochloratis*, dose 10 to 40 minims (0.65–2.65); *Tinctura Chloroformi et Morphinæ*, dose 5 to 10 minims (0.35–0.65); *Suppositoria Morphinæ* and *Suppositoria Morphinæ cum Sapone*, each suppository containing $\frac{1}{2}$ grain (0.03) of morphine; *Trochisci Morphinæ* and *Trochisci Morphinæ et Ipecacuanhæ*, each lozenge containing $\frac{1}{36}$ of a grain (0.002) of morphine, dose 1 to 4. *Liquor Morphinæ Acetatis* is given in 20- to 40-minin (2.65) doses. *Injectio Morphinæ Hypodermica, B. P.*, contains 1 grain (0.05) of the acetate of morphine in each 10 minims (0.65) of water.

Incompatibles.—Morphine is incompatible with potassium permanganate and with tannic or gallic acid or astringent solutions containing them, with alkalies, such as potassium, sodium, and ammonium, but with the chloride of ammonium it is not incompatible. With tincture of chloride of iron it forms a deep-red color (meconic acid).

OX-GALL.

Inspissated Ox-gall (*Fel Bovis, U. S.*) is, as its name implies, dried ox-bile, derived from the gall-bladder of the common ox (*Bos Taurus*). It is used in medicine for the purpose of relieving certain forms of indigestion which depend upon deficient secretion of bile or which occur in persons who digest fats with difficulty. In full doses it is apt to cause some looseness of the bowels, and it may be given with the object of producing this condition. When it is used the fact should be remembered that bile prevents the gastric juice from acting upon proteid or albuminous substances, shrivelling them up, and in addition so alters the gastric liquids as to decrease their digestive power. We know, therefore, that this drug must be administered some hours after meals, as a rule, or, in other words, when gastric digestion is ended and intestinal activity is beginning. The dose of inspissated ox-gall, which is dried by evaporation from 100 to 15 parts, is 5 to 15 grains

(0.35–1.0). Purified Ox-gall (*Fel Bovis Purificatum, U. S.; Fel Bovinum Purificatum, B. P.*) is given in the same dose as the inspissated bile. It is made by evaporating 3 parts of pure ox-gall to 1 part, and then adding to this part an equal amount of alcohol, which constituents are mixed thoroughly, and after standing twenty-four hours the clear liquid is decanted and the residue is evaporated to a consistency capable of forming a pill.

OXIDE OF ZINC.

Commercial Oxide of Zinc (*Zinci Oxidum Venale*) is not used in medicine, but in the purified form is largely employed in the shape of *Zinci Oxidum, U. S.* and *B. P.*, which is insoluble in water. In the form of the oxide-of-zinc ointment (*Unguentum Zinci Oxidi, U. S.* and *B. P.*) this drug affords one of the most generally used applications in the treatment of *skin diseases, burns*, and *sores*.

In all states where the surface of the skin is dry it is contraindicated, but where the eruption is moist it is useful. In the treatment of the *chloasma of pregnancy* the following prescription is of service:

℞.—Zinci oxidi	gr. iij (0.18).
Hydrarg. ammoniat.	gr. j (0.06).
Olei theobromæ	ʒijss (10.0).
Olei ricini	ʒijss (10.0).
Essent. rosæ	gtt. x (0.65).—M.

S.—Apply to the face night and morning.

In *eczema* with many vesicles use—

℞.—Pulv. camphoræ	ʒss (2.0).
Pulv. zinc. oxidi	ʒiij (12.0).
Glycerini	gtt. xl (2.65).
Adipis benzoinati	℥j (32.0).—M.

S.—Apply to the part without other treatment or precede it by powdered bismuth.

Under the name of Unna's Dressing (composed of gelatin 4 parts, water 10 parts, glycerin 10 parts, and zinc oxide 4 parts) is a useful application for ulcers and eczematous patches on the legs or arms. It is particularly useful for *leg ulcers*. The gelatin and cold water are put in a basin over a fire and a solution made; then the glycerin is added, and then the oxide of zinc is slowly added, with constant stirring. After the mixture is complete it is poured into a can and allowed to cool, when it is ready for use. This application decreases swelling and is soothing and supporting. It is applied as follows: The part affected is well washed with water and soap, and then with alcohol. The paint having been warmed and melted, a large three-inch paint-brush is used to apply a coating to the limb all around the ulcer, and over this a single layer of gauze is applied. The gauze bandage should be two inches wide. The bandage must be laid on evenly and the ulcer covered by a pad of absorbent cotton. After one layer is applied it is cut and another coat of paint applied over it. Then another layer of gauze and another of paint are used, until several layers are in place. It is best to begin at the toes and work up toward the knee. All parts should be equally well covered. Finally the entire dressing is covered by a cotton roller bandage, which is removed in twenty-four hours, leaving what looks like a white rubber dressing on the limb. If the liquid from the ulcer oozes through the dressing profusely, a window is to be cut over the ulcer, and it can be locally treated by astringents or other measures. The patient should keep the limb elevated for a day or two, but can then walk with far more comfort than if a rubber supporting bandage is used.

In powdered form zinc oxide is useful in the treatment of *intertrigo* and for *conjunctivitis*. Mixed with bismuth subnitrate and pepsin, it is largely used by some practitioners in the treatment of the *summer diarrhœa* of infants or adults.

In the *night-sweats* of debility or of *phthisis* oxide of zinc in the following formula has been highly recommended, but the prescription probably depends largely for its action on the second ingredient:

℞.—Zinci oxidi . . . . gr. xxx (2.0).
Extract. belladonnæ . . . . gr. iij (0.18.)—M.
Ft. in pil. No. x.
S.—One at night before going to bed.

Bartholow recommends the oxide of zinc for cases of *asthma* and *whooping cough*, given to an adult in the manner just indicated.

OXYGEN, OXYGEN-WATER.

The gas Oxygen is now widely used in medical and surgical practice in three ways, as follows: By the inhalation of the gas itself from a cylinder in which it is compressed until 40 gallons occupy a very small space; by drinking oxygen-water, which is distilled water saturated with the gas; and finally, by the use of the dioxide or peroxide of hydrogen, which is applied locally to diseased surfaces. (See Hydrogen Peroxide.)

Inhalations of oxygen are useful in the second and third stages of *pneumonia* where the patient seems about to die from deficient aëration of the blood, with resulting heart-distention. They are also of value in advanced *bronchitis*, particularly that of old persons, and for the resuscitation of persons asphyxiated by coal-gas (Hare and Martin). In *phthisis* and other exhausting diseases oxygen will allay dyspnœa and oppression. Oxygen inhalations are also of service in the treatment of *anæmia* in all its forms and give relief even in *pernicious anæmia* and in *leukæmia*. Often a mixture of oxygen gas 60 parts and nitrous oxide gas 40 parts is used as a stimulant inhalation and nervous sedative.

The clinical results which have so far been obtained from the administration of ether and chloroform vapor when combined with oxygen gas seem to prove beyond all doubt that the oxygen decreases the danger of the anæsthetic and to a large extent obviates the difficulties which surround the administration of these drugs, and most of the untoward effects which we are accustomed to meet with as a consequence of their use. Thus, when oxygen is given with ether, vomiting is less frequently met with, excessive pallor is rarely seen, and post-operative depression seems to be largely avoided.

As a general rule, however, it has been the custom of physicicans and surgeons who have employed oxygen gas in combination with ether or chloroform, to place the anæsthetic in a wash-bottle and then to allow the oxygen gas to pass through it in such a way that the patient received in the inhaler a mixture of anæsthetic vapor and oxygen, the mixture being made by the passage of the oxygen gas through the liquid anæsthetic in the bottle. An evident disadvantage of this arrangement is that the quantity of anæsthetic which is volatilized can only be in direct proportion to the volume of oxygen gas which is forced through the wash-bottle, and therefore with every increase in the quantity of vapor which the patient receives he must also receive an increased quantity of oxygen. It has been claimed, too, by those who have employed the ether and oxygen combination most frequently, that in a large proportion of cases a greater length of time is required for the anæsthetizing of the patient, and that in some cases it seems almost impossible to get the patient under the direct influence of the drug. This difficulty lies in the fact that as soon as a large quantity of oxygen gas is used to convey a large quantity of anæsthetic vapor to the lungs, the patient rapidly passes into a condition which is called by physiologists apnœa. The respiratory centre is no longer irritated by the normal proportions of carbonic acid in the blood, and therefore sends out feeble respiratory impulses; and as the patient does not breathe as rapidly or as deeply as before, the result is that very small quantities of the anæsthetic are taken into the body.

The apparatus which the writer has employed with success, and which he suggests as a substitute for the one heretofore employed, consists of a somewhat funnel-shaped piece of leather having a greater diameter in one direction than in another, into which is fitted as an inner lining a piece of soft felt or spongio-piline almost a quarter of an inch thick. In the under surface of the leather cone is inserted a small metal tube, and at the opening of this tube a small hole is cut in the spongio-piline. The ether is then poured upon the spongio-piline in the cone, in the apex of which is placed some absorbent cotton. The oxygen enters the cone by means of a rubber tube attached to the metal entrance which has been mentioned. By this arrangement several objects are accomplished. In the first place the supply of oxygen can be delivered to the patient in varying quantities without altering the amount of anæsthetic which is being given. In the second place, any quantity of anæsthetic can be employed without necessarily increasing the oxygen. Thirdly, the leather cone prevents the rapid evaporation of ether from the outer side of the spongio-piline. And fourth, the spongio-piline, being much more porous than an ordinary towel, will retain a large quantity of ether in liquid form when this drug is poured upon it. Finally, if desired, the same apparatus can be used for the administration of chloroform by removing the metal cap on the smaller end of the cone, as in this way the patient will receive not only the anæsthetic vapor and the oxygen, but also fresh air through the end of the cone, in such quantities as the physician deems wise. In these cases it is best to use the attachment known as the Krohne and Sesemann "respiration-indicator," which consists of a small feather on a pivot which moves to and fro with the motions of respiration, thereby providing the physician with a gauge as to the rapidity and force of the respiratory movements. The soft felt is very cheap, and a fresh piece can be used for each patient.

In conclusion, the writer cannot condemn too strongly the method of employing chloroform vapor and oxygen by passing the oxygen directly through the chloroform without the free administration of air in addition, for, after all, air is what we are intended to breathe, and not oxygen gas alone, although it may be advantageous at times to add an increased quantity of oxygen to the air.

Still more severe condemnation should be directed toward the attachment which is placed on some of the Junker inhalers, and which consists of a small rubber bag which, instead of acting as a reservoir of fresh anæsthetic vapor and oxygen, is inflated and collapsed by the expiration and the inspiration of the patient, who does not receive even fresh oxygen and anæsthetic vapor, much less fresh air, but, on the contrary, inhales again and again air, oxygen, and vapor which are loaded with the impurities of frequent expiratory efforts.

(For the directions for using oxygen with nitrous oxide as an anæsthetic see the article on Nitrous Oxide.)

In the preparation of the solution of oxygen gas the water must be distilled, so that it may be as free as possible from other gases. The bottling should be done under a pressure of 150 to 200 pounds, and the contents drawn off by means of a tap such as is used in siphons or for champagne bottles. Birch of England has found that the addition of a little nitrous-oxide gas to this water adds piquancy to its taste and increases its stimulating effects. The value of this preparation is undoubted, and when taken in the body it has proved of the greatest service in *chronic dyspepsia*, *persistent vomiting*, and *headaches* both digestive and neuralgic.

In *constipation* depending upon intestinal atony oxygen gas is said to give relief if it is taken in solution just before going to bed. It is hardly necessary to state that the water should be swallowed as soon as possible after it is taken out of the bottle which has contained it. In some cases where general *systemic torpor* is present oxygen-water taken after each meal, or even more frequently, may be used with advantage. One or two tumblerfuls may be taken each time.

PANCREATIN AND PANCREATIC EXTRACTS.

Under these names a number of firms now sell an extract from the pancreatic gland or juice, and the *U. S. P.* recognizes such a product under the name of *Pancreatinum*. It contains, or should contain, the four pancreatic ferments—trypsin, which digests proteids (meat, eggs, etc.); steapsin, which splits up and emulsifies the fats; amylopsin, which has diastatic power (that is, converts starch into sugar), and finally a milk-curdling ferment.

A preparation equally useful with the commercial pancreatin may be made by the physician in the following manner:

Take the pancreas of a pig which has been killed about six hours after a full meal, the organ being therefore active, and, after chopping it up fine, add to it four times its weight of dilute alcohol and allow it to stand for twelve hours. Decant or filter off the alcohol, and give the filtrate in the dose of 1 to 2 drachms (4.0–8.0). Or, better still, as follows: Wash and chop up fine a fresh pancreas, and allow the gland to soak in alcohol (absolute) twenty-four to forty-eight hours. After this squeeze out the alcohol and add to the gland ten times its weight of glycerin. This must stand forty-eight hours and then be filtered, and be used in doses of 30 drops (2.0) to each glass of milk. (For the use of pancreatin in artificial digestion see the article on Peptonized Foods in Part III.)

Pancreatin, as prepared for the market, is a dry powder, given in the dose of 2 to 20 grains (0.1–1.3) after meals or during them.

Pancreatin should usually be prescribed with bicarbonate of sodium to aid it in its digestive action. It is indicated in all cases of *lienteric diarrhœa* and in many cases of deficient digestion. Pancreatin, or the powdered pancreas, may also be freely used in those cases of *diabetes mellitus* in which the disease depends upon a lesion of the pancreatic gland, as carcinoma or atrophy from other cause.

Some doubt has been cast upon the usefulness of the employment of pancreatin in foods unless this ferment was allowed to act upon the aliment before it was swallowed by the patient, on the ground that pancreatin is destroyed and rendered inert in the presence of the acid which it meets in the stomach. This objection is not a valid one, because food remains in the stomach for from fifteen minutes to half an hour before enough gastric juice is secreted to interfere with the pancreatic action. It is during this preliminary period that the work of the pancreatin is accomplished.

Pancreatin or peptonized foods should not be employed unless really needed, nor continued for any length of time, as digestion is finally impaired by atrophy of the glands arising from disuse.

The dose of pancreatin is from 2 to 10 grains (0.01–0.65).

PAPAIN, PAPAYOTIN, AND PAPOID.

Papain, Papayotin, and Papoid are names given to a digestive ferment derived from the juice of *Carica Papaya*. This ferment possesses the power of changing proteids into peptones in the presence of an acid or an alkali, or even in a neutral mixture, thereby differing from pepsin and pancreatin. This power would be of very great value, since the drug would then be useful in all forms of dyspepsia, were it not that careful experimentation renders it doubtful as to whether papain, papayotin, or papoid can really supplant either of the animal ferments named above. The dose of all these products is from 1 to 8 grains (0.05–0.6) given in solution, or better in pill. The plant itself, taken internally, has the reputation of being capable of causing abortion.

PARALDEHYDE.

Paraldehydum, *U. S.* and *B. P.*, is a form of aldehyde used as a soporific and nervous sedative, and is a clear, colorless liquid with an ethereal odor and a burning, followed by a cool, taste. It should be kept in dark, well-stoppered bottles in a cool place. Paraldehyde is readily soluble in alcohol, moderately so in water, less so in hot water. It possesses the great disadvantages of being necessarily given in large dose and having a disagreeable taste and odor. It is also very apt to disorder the stomach. Paraldehyde kills when taken in overdose by respiratory failure, but is not so depressant to the heart as is chloral. The drug soon loses its power as a soporific. The dose is 20 drops to 1 drachm (1.3–4.0) in capsules, or, better still, it may be used, after the formula of Yvon, as follows:

℞.—Paraldehyde	ʒijss (10.0).
Alcoholis (90 per cent.)	f℥jss (45.0).
Tincturæ vanillæ	fʒss (2.0).
Aquæ	f℥j (32.0).
Syrupi simplicis	q. s. ad f℥iv (128.0).—M.

S.—A dessertspoonful (8.0) every half-hour until sleep is obtained.

PAREIRA.

Pareira, U. S. (*Pareiræ Radix, B. P.*), is the root of *Chondodendron tomentosum*, a plant of Peru and Brazil, and is used as a diuretic of an alterative or stimulant character and for the relief of chronic inflammations of the genito-urinary tract in general, such as *pyelitis*, *cystitis* of a subacute type, and similar pathological states. The dose of the unofficial infusion is a wineglassful (32.0), and the fluid extract (*Extractum Pareiræ Fluidum, U. S.*) is given in the dose of a teaspoonful (4.0) three times a day. The *B. P.* preparations of this drug are—the decoction (*Decoctum Pareiræ*), dose 1 to 2 ounces (32.0–64.0); the extract (*Extractum Pareiræ*), dose 10 to 20 grains (0.65–1.3); and *Extractum Pareiræ Liquidum*, dose 1 to 2 drachms (4.0–8.0).

PENTAL.

Pental is an impure amylene first described in 1844 and used in 1856. It at once dropped out of notice until a few years ago, when it was brought forward as an anæsthetic for use in minor or brief operations. Pental is a colorless liquid, insoluble in water, but readily mixed with ether, chloroform, or alcohol. It is very inflammable, but not affected by exposure to light and air.

Physiological Action.—Our knowledge of the physiological action of pental is exceedingly limited. Wood and Cerna, from a very incomplete and imperfect study, conclude that it is a powerful cardiac and respiratory poison.

Therapeutics.—Pental is to be employed by means of a Junker inhaler if its use is continued for any length of time. If it is to be taken for but a few minutes, an ordinary chloroform mask or towel may be used. The quantity to be employed for the production of anæsthesia is about 2 to 3 drachms (8.0–12.0). Pental is an anæsthetic which so far promises very little, and which will probably be used by a very limited number of practitioners, as it possesses no particular advantages over older and safer anæsthetics. It is, however, right to state that some surgeons employ it with great satisfaction. Thus, Phillip asserts that it is regarded as indispensable in the Children's Hospital of Berlin, as it acts very rapidly, produces little excitement, and permits rapid return to consciousness. It has been given in this institution one thousand times.

PEPO.

Pepo (*Cucurbita Pepo*), *U. S.*, Pumpkin-seed, the seed of the ordinary domestic pumpkin, is a useful and efficient vermifuge against the *tape-worm*. The seeds are not only efficient, but harmless to the host of the worm. The outer coverings of the seeds should be removed, and the remaining part rubbed up into an emulsion with water or into an electuary with sugar, the dose of the seed being 2 ounces (64.0). This mass should be taken on an empty stomach, and followed in from one to two hours by an active purge.

PEPPER.

Piper, *U. S.*, or Black Pepper (*Piper Nigrum*, *B. P.*), is the unripe fruit of *Piper nigrum*, a vine of India, Java, Borneo, and Siam. It contains a neutral principle, piperin, which is official.

Therapeutics.—Black pepper may be used externally as a counter-irritant or internally as a *carminative* and *stimulant* to the alimentary canal.

It may also be used in all cases of atony of the mucous membranes of the genito-urinary system, but is contraindicated whenever acute inflammation is present, as in acute gonorrhœa. It may be used in the treatment of great *intestinal flatulence* with marked relief.

Piperin (*Piperinum*, *U. S.*) has been used as an *antiperiodic* with varying success, and is given in the dose of 1 to 5 grains (0.05–0.25). The oleoresin of pepper (*Oleoresina Piperis*, *U. S.*) is given in the dose of ¼ to 2 drops (0.016–0.1) in laxative pills, to prevent griping. A confection (*Confectio Piperis*) is official in the *B. P.*, given in the dose of 1 to 2 drachms (4.0–8.0).

PEPPERMINT.

Mentha Piperita, *U. S.*, is official in the form of the leaves and tops of *Mentha piperita*. It has an aromatic odor and taste and contains an oil. Locally applied, the oil acts as an irritant and local anæsthetic. From this oil is obtained menthol, a camphoraceous substance of a hot, burning taste, possessing marked power as a local anæsthetic. (See Menthol on next page.)

Therapeutics.—Peppermint is used very largely as a domestic remedy for *flatulence* and *infantile colic*. Sometimes the oil is added to purgative pills to prevent *griping*, and it may be employed to cover the taste of many medicines which are disagreeable to take. In this respect it is used as are all the volatile oils. In the *colic* of children of six months to a year, when it is unusually severe and associated with nervous symptoms, the following will be found of value:

℞.—Chloralis . . . . gr. xvj (1.0).
Potassii bromidi . . . . gr. xxxij (2.0).
Aq. menth. piperit. . . . . f℥ij (64.0).—M.
S.—Teaspoonful (4.0) in a little warm water every four hours.

When used in the treatment of *neuralgia*, oil of peppermint should be placed on a piece of linen or muslin rag and applied over the affected spot. Care must be taken that it does not blister the skin. If, after its removal, the burning is too severe to be borne, a little cosmoline or olive oil should be applied. Oil of peppermint is sometimes placed on cotton and inserted into dental cavities for *toothache*.

It is to be remembered that the more menthol is present in the oil the more active will it be as an anæsthetic, and that the Chinese oil contains more menthol than the American oil.

Administration.—Peppermint is used in the form of the oil (*Oleum Menthæ Piperitæ*, *U. S.* and *B. P.*), dose 1 to 4 drops (0.05–0.25); the spirit (*Spiritus Menthæ Piperitæ*, *U. S.* and *B. P.*), dose 10 to 30 drops (0.65–2.0); the water (*Aqua Menthæ Piperitæ*, *U. S.* and *B. P.*), dose 1 to 2 drachms (4.0–8.0); and, finally, as the Troches (*Trochisci Menthæ Piperitæ*, *U. S.*), to be held in the mouth in indefinite number. *Essentia Menthæ Piperitæ*, *B. P.*, is given in the dose of 10 to 20 minims (0.65–1.3).

Menthol.

Menthol, *U. S.*, or Mint Stearopten, or, as it is sometimes called, Mint Camphor, is derived chiefly from the essential oil of peppermint. It occurs in colorless prismatic crystals with a strong odor of peppermint. Upon it rests much, if not all, of the therapeutic activity of peppermint. Menthol is slightly soluble in water, very soluble in alcohol, ether, and in oils.

Menthol has been used in the *vomiting of pregnancy* with great advantage in hourly doses of a teaspoonful of the following:

℞.—Menthol . . . . gr. xv (1.0).
Spt. frumenti . . . . fʒvj (24.0).
Syrupi . . . . f℥j (32.0).

Menthol has also been used as a carminative and in *gastralgia* in the dose of from 1 to 2 grains (0.05–0.1) three times a day in pill or in alcoholic solution. It is contraindicated in acute inflammation of the gastric mucous membrane.

As menthol exercises a local anæsthetic effect on the skin as well as on mucous membranes, it is used externally over the course of *neuralgic nerves* and for *migraine*.

Menthol when used as a depletant on the mucous membranes of the throat or nose causes a contraction of the local blood-vessels, which is not followed by the excessive dilatation produced by cocaine when used for similar purposes. In *acute coryza* its local application to the mucous membrane by a spray or dropper is often a source of great relief in a solution of about 1 grain (0.05) to the ounce (32.0) of water, or, better still, 3 grains (0.25) of menthol in ½ an ounce (16.0) of albolene. (See Coryza, Part IV.)

Another very useful method of applying menthol is by means of a simple inhaler consisting of a small glass tube of about one-quarter of an inch in diameter and two and a half inches in length. Both ends are closed by a piece of gauze and two perforated corks, the menthol being placed in between. The air is now drawn through this tube, and, being heavily loaded with the fumes, clears the nostril and relieves the stuffiness. It is not to be only smelled, but inhaled. Care should be taken that the crystals are not allowed to enter the nostril, as they are almost cauterant in power. Sometimes, where great excoriation of the alæ of the nose exists, the too persistent use of the menthol may produce small herpetic spots about the nostrils.

Emplastrum Menthol, B. P., is used as a mild local irritant and anæsthetic.

PEPSIN.

Pepsinum, U. S. and *B. P.*, is the digestive ferment of the gastric juice. That sold in the shops is generally derived from the pig, and is prepared by many persons in many ways. Much of the pepsin of the market contains more peptone than pepsin, and much mucus and albumin. Used with hydrochloric acid in weak solution, pepsin carries out the digestive action of the stomach. Pepsin containing peptone has the peculiar musty smell of peptone, and if the peptone is in excess will absorb moisture and become sticky on exposure to the air.

According to the *U. S. P.* of 1890, official pepsin must have the power to digest three thousand times its weight of albumin.

Therapeutics.—Pepsin is a much-overrated remedy for indigestion. Pancreatin will always be found more serviceable, and should be given either immediately or one or two hours after meals. Pepsin should be used immediately after the food or with it. Hydrochloric acid should always be given, as its presence converts any pepsinogen in the gastric tubules into pepsin. Pepsin is official in the *U. S. P.* as *Pepsinum* and *Pepsinum Saccharatum.* The dose of the latter must be 20 to 30 grains (1.3–2.0) to be of any service. It is a weak and almost useless preparation, largely made up of milk-sugar. *Liquor Pepsini* is given in the dose of 2 drachms (8.0). Pure pepsin should be given in 5- to 15-grain (0.35–1.0) doses.

A very useful and readily taken liquid preparation is Pepsin Cordial, which is given in the dose of 1 to 2 drachms (4.0–8.0) after meals. A nutritious article of diet can be made by adding one teaspoonful of this cordial to a half pint of warm milk, and allowing it to cool, thereby forming "curds and whey." (See Part III.)

PERMANGANATE OF POTASSIUM.

Potassii Permanganas, *U. S.* and *B. P.*, is a salt of a dark purplish-red color, appearing in small crystals and readily soluble in water. In the presence of moisture it rapidly gives up the oxygen which it contains and becomes the binoxide of manganese.

By reason of this oxidizing power the permanganate of potassium is useful as an antiseptic and deodorant. It should not be employed as a *disinfectant*, because its action is too fleeting, but in saturated solution, followed by oxalic-acid solution, it proves itself the best disinfectant for the hands in surgical practice. (See Antisepsis.)

Permanganate of potassium is given in the same dose for *amenorrhœa* as the binoxide of manganese, but is much less efficacious. It is also very apt to irritate the stomach.

The permanganate is thought to be usefnl in *dyspepsia*, *flatulence*, *lithæmia*, and *obesity*, and in the former states is certainly of service, being a destroyer of the abnormal products by oxidation. Owing to this oxidizing power, it has been asserted, by Weir Mitchell and Reichert, to be the most efficient antidote to *snake-venom* if placed in the wound before the poison is absorbed. It should also be injected hypodermically about the seat of the bite. Permanganate of potassium is the best antidote in poisoning by morphine and that caused by many other vegetable alkaloids. Owing to its rapid evolution of oxygen, it acts as an antiseptic, and may be used in the washing of *wounds*, *ulcers*, and *sores*, and as a lotion in the form of a gargle or on a swab in the sore throat of *diphtheria* and *scarlet fever*. The solution used should be from 20 to 60 grains (1.3–4.0) to the pint (½ litre); the former is used on mucous membranes, the latter for sores and wounds. In *fœtld rhinitis* and *otitis media* permanganate solution is useful as a wash in the proportion of 1 grain (0.05) to the ounce (32.0). When given in solution permanganate of potassium should be dissolved in distilled water, and it should never be mixed in a mortar with any organic matter, as it will explode. A solution (*Liquor Potassii Permanganatis*) is official in the *B. P.*

PETROLATUM.

Under the name of *Petrolatum Molle*, *U. S.*, or Soft Petrolatum, or *Unguentum Petrolei*, is sold a semi-solid substance derived from certain kinds of petroleum, and sometimes called Cosmoline or Vaseline.

Owing to its soothing powers and non-rancidity, it is used as an emollient dressing in sores and skin affections. It has no value except as a protective, and may be given in capsules in cases of gastro-intestinal irritation in any quantity as a soothing treatment. It does not affect the passages from the bowels and is not absorbed, although assertions to the contrary have been made.

Cosmoline is a useful ointment base for medicines for the skin. Under the name of fluid or liquid petrolatum (*Petrolatum Liquidum*, *U. S.*) a fluid form is sold, which is much used in the form of a spray in the treatment of rhinitis and after irritant applications to the nasal cavities.

The U. S. P. now recognizes, in addition to these two preparations, *Petrolatum Spissum*, which has the consistence of a cerate.

PHENACETIN.

Phenacetin (*Phenacetinum*, *B. P.*) is a coal-tar product introduced several years ago as an antipyretic of the same character as antipyrin, and, while more apt to disintegrate the blood than the latter drug when given in large amounts, is not very dangerous, because its influence upon other vital parts is not severe.

When this drug is carelessly made an impure product is the result, which produces irritation of the kidneys, and, in consequence, causes grave complications. Reuter states that the impurity may be discovered by placing a small amount of chloral hydrate in a test-tube, melting it at the temperature just sufficient to liquefy it, and then adding the suspected sample of phenacetin in the proportion of one-fifth. If the phenacetin is impure, it will become purple, then red, and finally blue.

Physiological Action.—Unfortunately, our knowledge of the physiological action of phenacetin upon the nervous system is not as thorough as is desirable. We know, however, that it is a distinct nervous sedative, and that it acts particularly on the spinal cord in its sensory tracts.

Upon the circulation the drug has little or no effect, unless given in doses far above those generally employed or continued in overdose for some time. The blood after the ingestion of these doses becomes dark and blackish from the formation of methæmoglobin, and the urine becomes dark yellow and reacts with Fehling's solution. Upon normal bodily heat and the heat of fever the drug exerts a depressing effect, decreasing the production and increasing the dissipation of heat.

Therapeutics.—Our knowledge concerning the influence of phenacetin upon the human body in disease may be divided into two separate parts in much the same manner that we divide the uses of antipyrin—namely, its uses as an antipyretic and as an analgesic.

Like the other members of the antipyretic group which are blessed with this double action, its antipyretic influences were first observed, and shall therefore first be spoken of.

The employment of this drug in medicine was first attempted by Hinsberg and Kast, who from the very first spoke of it in the highest terms of praise. They found that it seldom, if ever, caused serious untoward effects, and that its power over fever, in the dose of from 3 to 8 grains (0.15–0.5), was quite extraordinary. Very shortly after the paper of these writers appeared Kohler published the report of its use in some fifty cases in the clinic of Bamberger of Vienna, the febrile affections being tuberculosis, pneumonia, typhoid fever, pleurisy, and several other diseases of like character. He found, as have most of his successors, that the fall of fever does not occur for nearly half an hour after the dose is taken, and that the stage of apyrexia continues for from four to eight hours afterward.

As a general rule, sweating was not noted as being present to any great extent, but in phthisis and advanced typhoid fever there can be no doubt that chilliness and an abnormal fall of temperature may come on under its influence. Cyanosis and vomiting did not occur in a single one of Kohler's cases. In a very instructive case of pneumonia due to septic infection in a patient of twenty years phenacetin not only lowered the fever, but in addition decreased, to a large extent, the blood in the urine, and did not in the slightest degree influence the kidneys unfavorably. That the drug has power is evidenced by the fact that Kohler used it only when the temperature reached as high as 103°, 104°, or 105° F., and in these cases the temperature fell not less than from three to five degrees.

It is a very important fact to be remembered that morning doses of phenacetin seldom have as powerful an antipyretic influence as evening doses. Two morning doses are only equal to one evening dose in most cases.

The conclusions of Kohler have been confirmed by Hoppe in a long series of studies, and this writer also points out the deleterious excess of apyrexia which sometimes comes on in debilitated cases of phthisis under its use.

One of the advantages of having several drugs belonging to one class is the benefit often derived from the use of one where another has failed. Thus Hueber found that in several instances phenacetin was successful where antipyrin had not acted, and believes it to be the more powerful drug of the two—a conclusion also reached by Heusner, who thinks that 15 grains (1.0) of phenacetin are equal to half as much acetanilid and to 30 grains (2.0) of antipyrin. Lepine, who has studied with so much care the other antipyretics, also believes it to be superior to them all; and in this Guttman is largely of the same opinion.

These conclusions as to phenacetin are, in the author's belief, far too favorable, for, while he has found the drug to possess powerful antipyretic activity and to be useful in nearly all the fevers where antipyrin can be employed, he does not look upon it with the same degree of confidence that he does the latter drug when anxious to reduce a fever which seems dangerous and worthy of rapid and certain reduction; neither does he believe it to be as safe as antipyrin.

Upon the nervous system phenacetin acts as an antineuralgic—is of service in *migraine* and ordinary *headache*, from *eye-strain*, in the [illegible] of tabes dorsalis, in *intercostal neuralgia*, and in *rheumatism*. [illegible] it cures these troubles when antipyrin fails. Altogether, [illegible] consider phenacetin a rival of antipyrin in the power to

[illegible] the following prescription may be ordered:

. . . . gr. x (0.65).
[illegible] . . . . gr. v (0.35).
. . . . gr. xx (1.3).—M.

[illegible] while pain lasts.

In *subacute rheumatism* and in the lumbar or muscular pains of *influenza* a powder or pill of 4 grains (0.3) of phenacetin and 5 grains (0.35) of salol given three or four times a day is most efficient.

Under the name "*Lactophenin*," a nearly related compound of phenacetin is sometimes used for the same purposes. In phenacetin one atom of hydrogen is replaced by an acetic-acid radical; in lactophenin this atom of hydrogen is replaced by a lactic-acid radical. Similarly "apolysin" is made by replacing the atom of hydrogen by a citric-acid radical. It is also used as a substitute for phenacetin. As phenacetin is sometimes called acetphenetidin, lactophenin might be called lactophenetidin and apolysin citphenetidin. It is asserted that apolysin differs from the other drugs just named in that in it there are two complete citric-acid groups, and that it is much less poisonous than phenacetin. The dose is about the same as that of phenacetin, or a little larger, about 5–10 grains (0.30–0.65) three times a day.

PHENOCOLL.

Phenocoll is a compound closely allied to phenacetin. It is always used in the form of the hydrochloride of phenocoll, which occurs in a fine white powder, quite soluble in water and forming a neutral solution. It is incompatible with alkalies. It is used as an antipyretic.

Physiological Action.—A number of studies of the action of phenocoll hydrochloride upon the animal organism have been made by Kobert and von Mering in Europe, and by Wood and Cerna and Ott in America. These investigators have found that it separates itself from most of the coal-tar antipyretics in that it has little effect on the red blood-corpuscles. It does not cause so great a sweat when the fever falls as do its near antipyretic relatives. Von Mering has shown that phenocoll has little lethal power, but Ott asserts that in poisonous dose it kills by failure of respiration, and causes paraplegia, cyanosis, and depression of the heart.

Therapeutics.—Whatever advantages further clinical experience will show this drug to possess over its older fellows in the antipyretic field, it can never be widely used as a remedy for fever, since no drug is now generally employed for this effect except in a limited class of cases. As pointed out in the article on the treatment of Fever, antipyretic drugs are of little value as compared to bathing. Phenocoll may be given for the same purposes and under the same circumstances in the presence of fever as can antipyrin or acetanilid, but, like these drugs, is contraindicated in advanced exhausting diseases, such as consumption. A number of clinicians have tried phenocoll hydrochloride for the relief of rheumatism and to remove neuralgic pain, with asserted success. As yet it has not been used largely enough to ensure its continuance as a remedy of positive value, except in cases of malarial fever, in which it seems to possess distinct remedial power. The dose of phenocoll hydrochloride is 5 to 8 grains (0.35–0.6) two to five times a day. It is best given in capsule.

PHOSPHATE OF SODIUM.

Sodii Phosphas, U. S. and *B. P.*, is a preparation which has been used with the idea that it can supplant phosphorus. This is, of course, an error, as it has an entirely different effect. It is particularly useful for bottle-fed children, who continually alternate between *diarrhœa* and *constipation*, and is also useful for *rickets*. It should be added to each bottle of milk in the dose of 2 to 4 grains (0.1–0.2). Phosphate of sodium in small doses is slightly laxative, and large doses are purgative. Bartholow believes phosphate of sodium to be the best remedy that we have in *hepatic cirrhosis* and *jaundice*. To adults it should be given in the dose of 20 grains to 2 drachms (1.3–8.0) once, twice, or thrice a day according to the laxative effect desired.

Many cases of general wretchedness or headache due to an excess of uric acid in the blood are relieved by the acid phosphate of sodium or of calcium, since both substances cause the disappearance of the acid from the blood, not by causing its elimination, but by causing its deposit in the tissues in the form of urates. The continued use of these so-called acid phosphates is therefore ultimately harmful in gouty or rheumatic persons.

(For an explanation of the purgative action of all salines see article on Magnesium Sulphate.)

PHOSPHIDE OF ZINC.

Zinci Phosphidum, U. S., is often used in place of phosphorus, owing to its greater stability and readiness of administration. The dose is $\frac{1}{10}$ of a grain (0.006) three times a day. It is used in gelatin-coated pills.

PHOSPHORIC ACID.

The pure acid is very rarely employed in medicine, but when given is used in 2- to 8-drop (0.1–0.5) doses. In the form of dilute phosphoric acid (*Acidum Phosphoricum Dilutum, U. S.* and *B. P.*) it is widely employed in the dose of 20 drops to 1 drachm (1.3–4.0) as a tonic and gastric stimulant. It is not a food to the nervous system, does not resemble phosphorus in its physiological action, and is not to be employed in its place. It does good in *nervous exhaustion* simply by stimulating the stomach and thereby aiding that organ in the digestion of food.

PHOSPHORUS.

Phosphorus, U. S. and *B. P.*, is a non-metallic element, generally obtained from bones, and is very soluble in oils, less so in ether and alcohol. Its odor is very characteristic and peculiar. When placed in a dark room after exposure to light it is luminous, and if exposed to the air will ignite. It should be kept in tightly-stoppered bottles under water. Very commonly it is contaminated by arsenic and sulphur.

Physiological Action.—Phosphorus is found in large amount, comparatively speaking, in the bones and in the nervous system, and is a stimulant to the growth of both. It acts, therefore, as a direct tonic to nervous tissue and is a producer of bone. Upon tissue-waste the drug acts as a depressant, thereby preserving the body, as it decreases the elimination of urea and diminishes the quantity of carbonic oxide exhaled.

Upon the growth of bones phosphorus has a most remarkable influence, causing, when it is given to young animals, great increase in the size of these parts. The first change noted is an enlargement, which consists in a jelly-like mass containing little or no bone salts, and this is finally converted into a very hard material which may fill the entire canal in the centre of the bone. Kissel has stated that this does not occur, but his results must be doubted in view of the thorough studies of Wegner.

Acute and Chronic Poisoning.—When phosphorus is taken in poisonous dose, often from the ends of matches, no symptoms may come on for eight or ten hours. At the end of that time the peculiar taste of phosphorus may be noted in the mouth, the breath is heavily laden with its odor, and burning pain in the œsophagus, stomach, and abdomen becomes a pressing symptom. Vomiting and purging now assert themselves, and both the matters which are vomited and those which are passed from the bowels may be luminous in the dark, owing to the presence of phosphorus. The vomit at first consists of food, then mucus, then bile, and then perhaps blood. All the symptoms of a mild gastro-enteritis may develop, but it is to be noted that constipation of an obstinate type may be present instead of purging. Very soon the liver increases in size, and gives rise to general hypochondriac pain and tenderness as well as local swelling. At the end of twenty-four hours, or perhaps after the second day, a cessation in the symptoms occurs, and, if the physician be not on his guard, this will lead him to a hopeful prognosis, but in the course of a few hours jaundice begins in the conjunctiva and then extends over the entire body. With the onset of jaundice the vomiting and pain return with renewed vigor. The matters vomited are often the color of "coffee-grounds," due to exuded and altered blood. The bowels are absolutely confined, or the few hard masses of fecal matter which are passed are white and clay-like because of the absence of biliary coloring matter. There is no bile in the vomit in this stage, because the hepatic ducts have been closed by the inflammation which has been produced in the liver. Later, nervous symptoms ensue. Muscular twitchings, headache, vertigo, wild delirium, erotic convulsions, and finally unconsciousness and death, occur. Sometimes the convulsions occur just before dissolution. Even if the patient survives the acute stage of the poisoning, he generally dies of the changes produced in his vital organs, which consist in widespread fatty degeneration. These fatty changes occur even in the acute form of the poisoning. Atrophy of the liver, destruction of the gastric tubules, pancreatic involvement, and kidney degenerations aid in producing the ultimately fatal results.

During the poisoning by phosphorus the urine is scanty and perhaps albuminous, and is peculiar because of the unusual substances which are found in it. The most unusual of these is sarcolactic acid, which results from the breaking down of the muscular tissues. Leucin and tyrosin are also found, and tube-casts with fatty globules in them are seen. Free fat-globules may also occur. Bile acids and bile coloring matter are found in large amount, and the urine is generally dark-colored for this reason. As phosphorus is eliminated in the urine as hypophosphoric acid, this substance is also present.

The symptoms of phosphorus poisoning may so closely resemble those of acute yellow atrophy of the liver as to make a differential diagnosis impossible, unless some evidence of the presence of phosphorus is obtainable.

In chronic poisoning by phosphorus, when, by the inhalation of its fumes, systemic changes occur, the most common lesion is necrosis of the lower jaw, which may be widespread or limited. It never occurs in those who have no solution of continuity in the teeth or gums, and for this reason it is necessary that the employés in match-factories should have their teeth and gums constantly attended to. It has been said that pans containing turpentine when set around the work-room will protect the workmen, but this is certainly incorrect.

TREATMENT OF ACUTE POISONING.—The antidote to phosphorus is generally taught to be the sulphate of copper, which will also act as an emetic if given in excess, but recent studies made by Thornton in the laboratory of Jefferson Medical College prove that it is as dangerous a poison as the phosphorus. Peroxide of hydrogen and permanganate of potassium are probably the best antidotes. Oil of turpentine, in America, is not only valueless as an antidote, but harmful, for only old, ozonized French oil of turpentine is antidotal in its influence. As phosphorus is soluble in oils, we simply aid in its absorption if any such substances are given.

Therapeutics.—Owing to its influence on the development of bone, phosphorus is very useful in *rachitis* and *osteomalacia*. It is also useful in the *sweats* of general or *nervous debility* and in *nervous exhaustion*, and in some cases of melancholia depending upon overwork. In the course of prolonged exhausting diseases, as *typhoid fever* or *typhoid pneumonia*, the drug is of service if the nervous system seems to be particularly affected, and in convalescence it is of service in aiding to build up the shattered forces of a patient.

In the sequelæ of *acute* and *chronic alcoholism* and in *morphiomania* it is of service. Phosphorus is also employed in *sexual exhaustion* or abuse. In *boils* and *carbuncles* and similar disorders phosphorus is very useful, particularly so in *acne indurata*. In *pneumonia* some physicians use minute doses with the belief that it aids in the production of resolution, one of the most enthusiastic of these being Dr. Boardman Reed.

In the *neuralgia* from *nerve-depression* and in *cerebral softening* and meningitis of a chronic type phosphorus often does good.

The dose of phosphorus is $\frac{1}{100}$ to $\frac{1}{50}$ of a grain (0.0006–0.0012) in pill form (*Pilulæ Phosphori, U. S.* and *B. P.*) but it may be gradually pushed to $\frac{1}{20}$ of a grain (0.003) if urgently needed. Phosphorated oil (*Oleum Phosphoratum, U. S.* and *B. P.*) and *Spiritus Phosphori, U. S.*, are given in the dose of 1 to 5 minims (0.05–0.35). *Elixir Phosphori* (*U. S.*) is given in the dose of 15 minims to 1 drachm (1.0–4.0).

The beginning dose of phosphorus should not be above $\frac{1}{100}$ of a grain (0.0006), for fear of some idiosyncrasy.

PHYSOSTIGMA.

Physostigma, U. S. (*Physostigmatis Semen, B. P.*), is a seed derived from *Physostigma venenosum*, a tree of West Africa, often called Calabar bean. It contains two alkaloids, eserine or physostigmine and calabarine. The former is the most important from a medical point of view.

Physiological Action.—When a moderate dose of physostigma is given by the mouth it often produces some pain in the stomach and a sense of oppression and weakness. The pulse becomes slow, the respiration is depressed, and the pupils are contracted. Calabar bean in poisonous dose is a general paralyzant, but if the alkaloid calabarine be present in excess, it may be a convulsant.

NERVOUS SYSTEM.—On the spinal cord in poisonous dose this drug acts as a depressant poison, particularly affecting the sensory tracts. On the motor nerves it exerts no influence unless given in toxic doses, when it depresses their peripheral ends. The sensory nerves escape, but sometimes even they are involved. On the voluntary muscles the drug in these doses causes twitchings. In medicinal doses the drug is a stimulant to unstriped muscular fibre and acts as a mild nervous sedative.

CIRCULATION.—Calabar bean causes little circulatory change, but poisonous doses at first produce a rise of arterial pressure, due to a direct stimulation of the heart and of the muscular coats of the vessels. It slows the pulse by peripheral stimulation of the vagi. In medicinal dose its circulatory effect is not marked, but is depressant rather than stimulant.

RESPIRATION.—In moderate amount Calabar bean does not affect respiration, but in poisonous dose it produces death by paralysis of the respiratory centre.

PUPIL.—Physostigma causes myosis or contraction of the pupil by stimulation of the oculo-motor nerves peripherally, but not by depression of the sympathetic fibres, and by causing contraction of the blood-vessels of the iris. It decreases intraocular tension, produces temporarily an increase in the power of accommodation for near objects, and then causes spasm of accommodation. The myosis usually develops in about eight to fourteen minutes after the drug is dropped into the eye, and reaches its maximum in thirty minutes, lasting for from six to eight hours. The partial influence may last, however, for from four to five days.

Alimentary Tract.—Physostigma is a stimulant to intestinal peristalsis, increasing the muscular activity in the walls of the gut and acting as a tonic to these fibres.

Poisoning.—Poisonous doses of physostigma cause muscular tremors, followed by complete muscular relaxtion. The pupils contract, the respirations become slow and irregular, and all reflex action fails. Vomiting or purging may or may not occur.

Treatment of Poisoning.—This consists in the use of atropine, which is the physiological antidote, in the application of heat to the body, and the use of respiratory and cardiac stimulants, such as digitalis, alcohol, or ammonia.

Therapeutics.—Calabar bean has been employed in many affections, such as *trismus neonatorum*, *tetanus*, and other *spasms*, with only moderately good results. It is, however, of value in atony of the bladder and intestines and in catarrh of the bowels. The author has used it with advantage in cases of *gastric* and *intestinal dilatation*, combined with nux vomica.

In *bronchial asthma* and *emphysema* it will aid in the expulsion of the mucus by its influence over the muscular fibres in the walls of the air-tubes. It is also useful in purgative pills to stimulate the muscular fibres of the intestine. (See Constipation.)

Administration.—Physostigma is used in the form of the extract (*Extractum Physostigmatis*, *U. S.* and *B. P.*) in the dose of $\frac{1}{8}$ of a grain (0.008), which may be readily increased to $\frac{1}{4}$ of a grain (0.016).

The tincture (*Tinctura Physostigmatis*, *U. S.*) is given in the dose of 5 to 20 drops (0.3–1.35). This tincture is twice as strong as that official in the *U. S. P.* of 1880.

Eserine is usually employed in the form of one of its salts (*Physostigmina*, *B. P.*). *Physostigminæ Salicylas*, *U. S.*, and *Physostigminæ Sulphas*, *U. S.*, may be used in the dose of $\frac{1}{80}$ of a grain (0.0008) three times a day. The sulphate is much more soluble, and is generally to be employed. The salicylate is largely used, nevertheless, by ophthalmologists. In the eye, of the strength of 1 to 2 grains to the ounce (0.05–0.1 : 32.0) of water, eserine is used in the treatment of *corneal ulcerations* and for the relief of *glaucoma* and for the relief of high intraocular tension. If, for any reason, *atropine mydriasis* is to be rapidly overcome, eserine is to be used, but it is not so powerful as atropine, and it will require larger amounts of the solution to produce contraction than it took of atropine to cause mydriasis. *Lamellæ Physostigminæ*, *B. P.*, each contain $\frac{1}{1000}$ of a grain (0.00006) of physostigmine. The dose of both salts of eserine is $\frac{1}{100}$–$\frac{1}{80}$ of a grain (0.0006–0.0008.)

PICRIC ACID.

Picric Acid or Trinitrophenol occurs in light-yellow scales or needles without odor, and is chiefly used in the arts as dye. Its uses in medicine are very limited. Recently it has been found exceedingly efficacious in solution in the treatment of *burns* and *scalds*. This solution is made as follows:

℞.—Acid. picric.	gr. lxxv (5.0).
Alcohol.	f℥iiss (75.0).
Aquæ destillatæ	Oij (1000 c.c).—M.

After the burn is cleansed of dirt and charred clothing, strips of sterilized gauze are soaked in this solution and applied to the part. Over this is placed a pad of dry absorbent cotton which is fastened by a light bandage. The dressing rapidly dries, and may be left in place for several days. It is then moistened with the solution so as to soften it, is removed, and then a fresh dressing is applied for a week. All blisters should be pricked. This dressing relieves pain, stops suppuration, and leaves a smooth cicatrix.

PILOCARPUS.

Pilocarpus, U. S. (*Jaborandi, B. P.*), is derived from the South American tree, *Pilocarpus Selloanus* or *Pilocarpus Jaborandi.* It contains two alkaloids, known as pilocarpine and jaborine, a volatile oil, and other minor constituents. The alkaloid pilocarpine is non-crystallizable and occurs as a soft mass, but the salts of pilocarpine are crystallizable. Jaborine is never used in medicine, and has an effect antagonistic to pilocarpine, or like atropine.

Physiological Action.—When jaborandi is taken in medicinal dose by a healthy man, it causes a deep flushing of the face and neck, followed by the outbreak of a profuse sweat, which, though beginning in these regions, rapidly spreads over the entire body. Accompanying the sweat, the salivation is often exceedingly profuse, so that saliva dribbles from the mouth. Nausea frequently comes on, and severe vomiting may appear in susceptible persons either during or after the sweating. On the contrary, some individuals are singularly insusceptible to the influence of pilocarpus, and this is particularly so, according to Ringer, with children, who will often take as much as 60 grains (4.0) of the crude drug before they perspire. Some adults also refuse to yield to its influence.[1] The sweat lasts from three to five hours.

NERVOUS SYSTEM.—Moderate doses have no effect on this part of the body, but poisonous amounts cause in the frog tetanic reflex convulsions, and finally paralysis, the latter being due to depression of the muscles and spinal centres. The motor and sensory nerves in man are not affected. Medicinal doses in man exercise no effect over the nerves.

CIRCULATION.—In large doses there is no doubt that jaborandi acts as a cardiac depressant rather than as a stimulant, and, while there may be no evidence of an experimental character pointing to such a conclusion, the fact exists in practical medicine. The drug causes in the lower animals a slow pulse and increased arterial pressure, in moderate quantities, the first change being due to an action on the inhibitory centres in the heart or on the peripheral vagi. Ringer, on the other hand, has proved that it slows the beat of the ventricles in the frog when they are separated from these centres, and believes that the drug acts directly on the motor centres of the heart-muscle and the muscle itself. In man the drug does not slow the pulse, but quickens it very markedly, often as much as forty to fifty beats per minute. The rise of arterial pressure seen in the animal is often replaced by a fall of pressure in man, and, though the pulse in animals is generally made stronger from its use, in man it is generally made weaker.

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[1] The writer has reported a case (see Idiosyncrasy) where a woman of thirty years received ¾ of a grain of the muriate of pilocarpine hypodermically in half an hour without any effect.

STOMACH.—Jaborandi sometimes produces nausea and vomiting by irritating the stomach and perhaps the vomiting centre.

TEMPERATURE.—Jaborandi lowers bodily temperature to a considerable degree, probably by the dilatation of the peripheral capillaries and the profuse sweat which it produces. This fall is sometimes preceded by a brief rise.

KIDNEYS AND TISSUE-WASTE.—Upon the kidneys jaborandi acts very slightly or very strongly, according to the dose that is given. Large doses, which produce a profuse sweat, naturally decrease the urinary secretion, and small ones undoubtedly increase it. Upon the tissue-changes in the body under pilocarpine no researches have been made, but it is an undoubted fact that in disease the excretion of urea is largely increased under the influence of this drug.

EYE.—Jaborandi contracts the pupil by stimulating the peripheral ends of the oculo-motor nerve in the iris.

SKIN AND SECRETION.—The amount of sweat caused by the drug in man may equal as much as a pint, and it is generally first acid, from the secretions of the sebaceous glands, then neutral, and finally alkaline. The sweating is not primarily due to vasomotor palsy, but to stimulation of the ends of the nerves supplying the glands and of the sweat-glands themselves. The sweat usually lasts about two to three hours. Sometimes excessive salivary secretion supplants that of the skin.

Pilocarpine increases the gastric, salivary, and lachrymal secretions, as well as that of the skin and kidneys. It also seems to have considerable influence over the secretion of milk.

Therapeutics.—Jaborandi, or, better still, its alkaloid, pilocarpine, is of some value for the relief of *dropsy* of the renal type. In that due to cardiac disease it is generally too depressing, and the author knows of a case in which a fatal result speedily followed its use under these circumstances. It may be used to abort an attack or paroxysm of *malarial fever*, but because of its depressant influence should never be employed in asthenic fevers, such as typhoid fever. In *pleurisy* with effusion it may be used, but more efficient remedies are elaterium, or salines given in concentrated form and at the proper time of the day. (See Magnesium Sulphate and Dropsy.) Better than all these is thoracentesis. Spaulding and de Schweinitz have both recommended very highly the hypodermic use of pilocarpine in the dose of $\frac{1}{12}$ to $\frac{1}{10}$ grain (0.005–0.006) a day for *opacities of the vitreous humor* of the eye. The fluid extract of jaborandi may be employed, but is apt to nauseate the patient. Diaphoresis should not be produced. Because of its myotic influence on the pupil pilocarpine is of very great value in the treatment of all conditions of the eye associated with increased intraocular pressure. It is so good a myotic as to be rapidly supplanting eserine for this purpose with some clinicians. The strength of pilocarpine solution for this purpose is 1 to 4 grains (0.06–0.25) to the ounce (30.0). It should be dropped into the eye, 1 or 2 drops at a time, every hour until the patient is relieved. Pilocarpine is also useful as an ocular tonic to relieve eye-pain after excessive use of the eyes, in the strength of $\frac{1}{10}$ grain (0.006), to the ounce (30.0). A few drops of this solution may be dropped into the eye three times a day. This solution should have a little boric acid (4 grains) added to it to prevent fungus growth. (See Asthenopia.) Clinical reports show that pilocarpine in small doses is a very good remedy in *tobacco* and *alcoholic amblyopia*.

Mitkowski has tried pilocarpine in *catarrhal jaundice* of a persistent type with great benefit, in the hypodermic dose of $\frac{1}{6}$ grain (0.01) every other day for three weeks. In *uræmic poisoning* pilocarpine is theoretically the most efficient and rapidly acting remedy that we have, and when used in *Bright's disease* it may be of value in several ways—first, by removing the strain on the kidneys; second, by eliminating the uræmic poison; and third, by decreasing the inflammatory condition in the kidneys by lowering the blood-pressure, which, it will be remembered, is the more constant effect of the drug in man. Care should always be used in the use of the drug lest cardiac depression ensue, and alcohol or strychnine may often be used with advantage to guard against this accident. The general consensus of opinion is that in the nephritis of middle years or advanced life with cardiac changes it is contraindicated. The author never uses it in chronic renal disease of the parenchyma. In the uræmic convulsions of pregnancy pilocarpine, while theoretically useful, has been proved by experience to do more harm than good through its depressing influences, although the drug in small doses certainly increases renal activity. The hypodermic dose of pilocarpine as a renal stimulant should be about $\frac{1}{30}$ to $\frac{1}{20}$ of a grain (0.002–0.003). In some forms of *profuse sweating*, such as come on at night in cases of general debility, pilocarpine, if given hypodermically or by the mouth about two hours before the sweat in the dose of $\frac{1}{20}$ of a grain (0.003), is often useful even where atropine fails. The good effect is produced by stimulating the sweat-glands and so overcoming their atony.

DaCosta, Salinger, and Barr have highly recommended the hypodermic injection of pilocarpine in *erysipelas* as a preventive and curative measure in the early stages of this disease, and their reports are so encouraging as to warrant a careful trial of the method. The proper dose is $\frac{1}{6}$ grain (0.01) every three hours until free sweating ensues. After this is accomplished the doses may be repeated every four or six hours. The author would fear that such active treatment might seriously affect the strength of the patient unless stimulants were also used.

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application for baldness:

R.—Extract. pilocarpi fluid. . . . . f℥j (32.0).
Tincturæ cantharidis . . . . f℥ss (16.0).
Liniment. saponis . . . . f℥jss (48.0).—M.

The author has found the following prescription peculiarl
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R.—Extract. pilocarpi fluid. . . . . fʒj (4.0).
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Alcohol. . . . . q. s. f℥iv (128.0).—
S.—Apply with friction in spots to the scalp, night and morning.

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Therapeutics.—Piperazine is used for the purpose of preventing the formation of renal and vesical calculi in the *uric-acid diathesis*, and also in cases where the excess of uric acid in the urine tends to produce *irritation of the bladder*. Similarly, its action has been found of value in treating vesical irritation due to this cause by washing out the bladder with a solution of piperazine of the strength of 1 per cent. Piperazine has also been injected into uric-acid deposits about the body or applied to the broken-down surfaces of these deposits in 1 per cent. solution, but the author has not been favorably impressed with this method, and would advise against its use—first, because it does little if any good, and, second, because the method is painful and apt to cause sloughs by interfering with nutrition of the skin, which is already lacking in health.

The dose of piperazine is 15 grains (1.0) in twenty-four hours. It is best given by dissolving this amount of the drug in 1 pint (½ litre) of water, and directing the patient to take a wineglassful of the solution frequently through the day. Owing to the effect upon the drug of exposure to air, it cannot be given in pill or powders, and should be freshly mixed each day. The writer has failed to obtain any results from the use of this drug in his practice.

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Pilocarpine certainly has a decided effect in encouraging the growth of hair, and applied locally will often do good in partial *baldness*. If too much pilocarpine is used, it is apt to cause the development of small pustules about the hair-follicles. Bartholow recommends the following application for baldness:

℞.—Extract. pilocarpi fluid.	f℥j (32.0).
Tincturæ cantharidis	f℥ss (16.0).
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The author has found the following prescription peculiarly efficacious in falling of the hair:

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Alcohol.	q. s. f℥iv (128.0).—M.

S.—Apply with friction in spots to the scalp, night and morning.

Antagonisms of Jaborandi.—Jaborandi is a physiological antidote to atropine and to agaricin. Four times the dose of pilocarpine must be used to equal a dose of atropine. Vomiting produced by pilocarpus is to be antagonized by morphine.

Untoward Effects.—Dimness of vision, vomiting, and sudden collapse, swelling of the salivary glands and tonsils, hiccough and strangling are sometimes met with after using pilocarpus. Sometimes bloody leucorrhœa is seen.

Administration.—The dose of jaborandi is 40 grains (2.65), used in the form of the powdered leaves in infusion. The fluid extract (*Extractum Pilocarpi Fluidum, U. S.*) should be used in the dose of 30 drops to 1 drachm (2.0–4.0). Pilocarpine is far superior to jaborandi, in that it does not so often produce nausea and vomiting. It is used in the form of the hydrochlorate (*Pilocarpinæ Hydrochloras, U. S.*), in the dose of from ⅛ to ½ of a grain (0.008–0.03) hypodermically, or ¼ to ½ of a grain (0.015–0.03) by the mouth.

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PIPERAZINE.

This is a substance, the chemical formula of which is $C_4H_{10}N_2$, which has been recently introduced into medicine for the treating of the *uric-acid diathesis*. It is not stable, and when exposed to the air attracts water and carbonic acid. Aqueous solutions are decidedly alkaline, but do not have any distinct taste.

Piperazine is peculiar in its power to dissolve uric acid, dissolving twelve times as much as will carbonate of lithium, while it is also entirely soluble in water, which lithium is not. When taken into the body the drug is partly oxidized and partly eliminated unchanged. Theoretically, piperazine, when taken into the body, forms with uric acid a urate of piperazine, which is soluble and readily eliminated. Experiments have been made to determine this point with very satisfactory results, but repeated clinical observation has shown that the administration of the drug causes an increase in the amount of urea in the urine with a decrease in the uric acid, indicating that under its influence oxidation is more complete.

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The dose of piperazine is 15 grains (1.0) in twenty-four hours. It is best given by dissolving this amount of the drug in 1 pint (½ litre) of water, and directing the patient to take a wineglassful of the solution frequently through the day. Owing to the effect upon the drug of exposure to air, it cannot be given in pill or powders, and should be freshly mixed each day. The writer has failed to obtain any results from the use of this drug in his practice.

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Administration.—The dose of the fluid extract of piscidia erythrina is ½ to 2 drachms (2.0–8.0); of the solid extract, 2 to 10 grains (0.1–

0.65). The alkaloid piscidine is not known to represent all the properties of the drug, and is not used in medicine.

PITCH.

Pix is a resinous exudation derived from several species of pines, firs, and spruces, and is, in one of its forms, obtained by the evaporation of wood-tar. It is used for various purposes, according to its derivation. Burgundy Pitch (*Pix Burgundica, U. S.* and *B. P.*) is derived from Norway spruce, or *Abies excelsa*, a plant of Europe and Asia. It softens and melts at the temperature of the body and is useful for plasters. In *muscular rheumatism* and in *chronic bronchitis* pitch is a mild and fairly useful local remedy for external use. In the form of the plaster (*Emplastrum Picis Burgundicæ, U. S.* and *B. P.*) and in the form of warming plaster (*Emplastrum Picis Cantharidatum, U. S.*) it is employed for the relief of deep-seated *sprains* and *bruises*, and acts as a mild counter-irritant, which may blister a tender skin. Canada Pitch (*Pix Canadensis, B. P.*) is obtained from the hemlock spruce of Canada and the United States, and is used for the same purposes as Burgundy pitch. The Canada-pitch plaster (*Emplastrum Picis Canadensis*) is employed for the same conditions as the plaster of Burgundy pitch.

Tar.

Under the name of *Pix Liquida, U. S.* and *B. P.*, or Tar, we have an empyreumatic oleoresin obtained by destructive distillation from *Pinus palustris* and other varieties of pine. It is a thick, dark oil, slightly soluble in water and soluble in alcohol, oils, and solutions of potassa and soda. By distillation of tar we obtain oil of tar (*Oleum Picis Liquidæ, U. S.*), which is sometimes used for *bronchitis* by inhalations from an atomizer, but is not a particularly use application. It should be diluted with some other oil or with fluid cosmoline. Tar itself is used in *subacute* and *chronic bronchitis* in 2-grain (0.1) pills and as a remedy for *gastro-intestinal catarrh*. Externally, it is used in *psoriasis* and other skin diseases needing stimulation. For the relief of *obstinate diarrhœa* Wood has highly recommended a mixture of tar made as follows: Add a pint of tar to a gallon of lime-water, and allow this solution to stand one week, stirring it every few hours. Decant the clear liquid and percolate it through powdered wild-cherry bark, allowing 1 ounce of the bark to be present for each pint passed through it. The dose is a wineglassful (30.0).

In *chronic bronchitis* tar-water is largely used, as a popular remedy, in Europe and England. Tar-water is made by shaking 1 part of tar with 4 parts of water several times during twenty-four hours, decanting, and filtering. The dose is from 1 to 2 pints (½–1 litre) a day as a drink. It at first increases the expectoration, but finally decreases it.

Syrup of Tar (*Syrupus Picis Liquidæ, U. S.*) is simply sweetened tar-water.

In *skin diseases* of the dry, scaly sort, such as *psoriasis*, tar ointment (*Unguentum Picis Liquidæ*, *U. S.* and *B. P.*), equal parts of tar and suet, is very useful if frequently applied, or the following may be used:

℞.—Sulphur. præcipitat. Picis liquidæ	āā ʒvj (24.0).
Saponis viridis Adipis	āā ℥ij (64.0).
Pulv. cretæ	ʒiv (16.0).

If the skin is tender, this prescription should be diluted with lard. Sometimes children will suffer from a persistent *dry chronic eczema* which resists all treatment; the following may then be employed with advantage:

℞.—Picis liquid.	ʒss (2.0).
Sulphur. præcip.	ʒss (2.0).
Unguent. zinc. oxidi	℥j (32.0).

S.—Apply night and morning.

Tar should not be used on the face, as it will stain the skin.

Wine of Tar (*Vinum Picis*) is made by adding together tar 1 pint, glycerin, white wine, and honey, of each ½ a pint, dilute acetic acid 1 ounce, and 3 quarts of boiling water, and shaking constantly at a temperature of 160° F. for several hours. It is then set aside to stand for some days and repeatedly filtered or strained through muslin. The dose is 1 to 4 ounces (32.0–128.0). It may be used instead of tar-water or tar-syrup.

PODOPHYLLUM.

Podophyllum, *U. S.* (*Podophylli Rhizoma*, *B. P.*), May Apple or Mandrake, is the rhizome and small roots of *Podophyllum peltatum*, a plant of the United States and Canada. Podophyllum contains a resin, podophyllin.

Therapeutics.—Podophyllum is the slowest-acting purge official in the Pharmacopœia. In small doses it is laxative, but is purgative and almost drastic in larger amounts. In overdose it may produce gastroenteritis. The drug particularly excites the flow of bile, and is used as a cholagogue. It is best given when the stools are dark in color, calomel being indicated when they are light. The author has found the following prescription useful in cases of intestinal flatulence and indigestion with constipation:

℞.—Podophyllin	gr. v (0.26).
Euonymin	gr. v (0.26).
Leptandrin	gr. v (0.26).
Ext. chiratæ	gr. xlv (2.8).
Creasotæ	gr. x (0.65).—M.

Ft. in pil. No. xx.

In children one or two months old who have *hard, stony stools* podophyllin is a good remedy. The dose should be given by dissolving a grain of the resin in a drachm of alcohol and using 2 drops or more of this on sugar once or twice a day. In children who suffer from *summer diarrhœa*, in which the passages consist almost entirely of water, which have a peculiar musty smell or a mouse odor, podophyllin in the dose of $\frac{1}{60}$ to $\frac{1}{50}$ of a grain (0.001–0.0012), repeated every few hours, is of service, seeming to control the passages and make them normal. This treatment will often succeed when all else fails. This statement is also true in regard to the *chronic diarrhœas* of adults, though the drug should be given in somewhat larger amounts in such cases. Podophyllin will also check *vomiting* in these doses in some instances, provided that the stomach is depressed and the liver is torpid. It should not be employed if the vomiting is due to irritation or inflammation of the stomach.

Administration.—Podophyllum is used in the form of the extract (*Extractum Podophylli, U. S.*), dose 1 to 5 grains (0.05–0.35); the fluid extract (*Extractum Podophylli Fluidum, U. S.*), dose 2 to 20 drops (0.1–1.3); and, more commonly than all, as the *Resina Podophylli, U. S.* and *P. B.*, or podophyllin, which is the best preparation. The dose of this preparation is from $\frac{1}{20}$ to $\frac{1}{10}$ of a grain (0.003–0.006) as a feeble laxative, and from $\frac{1}{10}$ to $\frac{1}{2}$ a grain (0.006–0.03) as a purge. The tincture of the resin (*Tinctura Podophylli, B. P.*) is given in the dose of 15 minims to 1 drachm (1.0–4.0).

POMEGRANATE.

Although *Granatum* (*U. S.*) is official, it is almost never used in America in its crude form. It contains an alkaloid known as pelletierine, this alkaloid being a colorless liquid, soluble in 20 parts of water and readily miscible with ether, chloroform, and alcohol. When acids are added to it, it forms crystalline salts, of which four are used—namely, the tannate, the sulphate, the hydrobromate, and the hydrochloride. The first is most commonly employed, and is a yellowish powder possessing an astringent taste. It is soluble in 700 parts of water and 80 of alcohol. Its physiological action needs further investigation, but the drug in poisonous amounts paralyzes the peripheral ends of the motor nerves in a manner closely resembling the action of curare. Sensibility is preserved. The loss of power is chiefly manifested in the lower limbs, in which at first there may be cramps. There may also be nausea and vomiting.

Therapeutics.—Originally, pomegranate was largely used in the form of the rind of the fruit in decoction as a vegetable astringent, but this practice has ceased because of its disagreeable taste and effect upon the stomach. The ailments which were supposed to indicate its employment were serous diarrhœa and profuse sweats. In some tropical countries the bark of the root is used as a vermifuge, and it is very efficient in removing the *tape-worm*. It is said that the bark of the root of the wild shrub is much more efficacious than that of the cultivated and more handsome plant. To be efficacious the dose of the decoction of the bark must be large. The drug is prepared by soaking 2 ounces (64.0) of the bark in 2 pints (1 litre) of water for twenty-four hours and then boiling down to a pint (½ litre). A wineglassful (32.0) of this is the dose which is generally given, and it may be repeated every hour until the whole amount is taken. The objection to this line of treatment is that it is unnecessarily severe, often purging and vomiting the patient excessively. The nausea produced is often great. Should purging fail to appear, it is necessary to give castor oil or other purge to dislodge the worm, and it is always necessary to starve the patient for twelve hours before the remedy is tried.

The dose of pelletierine is 3 to 5 grains (0.25–0.35), and the tannate is the salt always employed. Practically, the only pelletierine used is that of Tanret, and his preparation is a syrupy solution in each bottle of which is one dose of the drug.

As large doses as 20 grains (1.3) of pelletierine have been used, but as very serious paralytic symptoms have ensued after the ingestion of 5 grains by a susceptible woman, not more than this amount should be given. When pelletierine is used it should always be followed in two hours by a purge. Those who have used it most place great reliance on it.

The *B. P.* contains one official preparation of pomegranate—namely, the *Decoctum Granati Radicis*, the dose of which is 1 to 2 fluidounces (32.0–64.0).

PRUNUS VIRGINIANA.

Prunus Virginiana, U. S.—Wild Cherry, as it is incorrectly called—is the bark of *Prunus serotina*, a large tree of the United States and Canada. It contains two substances, known as emulsin and amygdalin, which when they come together in water form hydrocyanic acid.

Therapeutics.—Wild-cherry bark is largely used as a domestic tonic, and in the form of a syrup as a vehicle for *cough* mixtures.

It has been supposed that the hydrocyanic acid present allays the cough, but this is doubtful, as the acid is very fleeting in its effect and present in very small quantity.

Administration.—As a tonic it is used in the form of the infusion (*Infusum Pruni Virginianæ, U. S.*), dose ½ to 1 ounce (16.0–32.0), and the fluid extract (*Extractum Pruni Virginianæ Fluidum, U. S.*), dose 30 drops to 1 drachm (2.0–4.0). The syrup (*Syrupus Pruni Virginianæ, U. S.*) is given in the dose of 1 to 4 drachms (4.0–16.0).

PYROGALLOL.

Pyrogallol, U. S., sometimes called Pyrogallic Acid, is a triatomic phenol obtained by dry distillation of gallic acid, and should be kept in dark, well-stoppered bottles. It occurs in light white scales or crystals, has no odor, but a bitter taste. If exposed to the light, it becomes dark. It is soluble in 2½ parts of water, and readily so in ether and alcohol.

Therapeutics.—Pyrogallol is used in *parasitic skin diseases, in* ointment, in the strength of 30 to 100 grains (2.0–7.0) to the ounce (32.0). The stronger ointments exercise a mild caustic effect. It may be employed in place of chrysarobin in *psoriasis.* Unfortunately, it stains the skin a deep brown.

PYOKTANIN.

(See METHYL BLUE.)

QUASSIA.

Quassia, U. S. (*Quassiæ Lignum, B. P.*), is the wood of *Picræna excelsa*, a large tree of Jamaica and other islands of the West Indian group. It contains an active principle, named quassin, which is intensely bitter and an irritant to mucous membranes.

Quassia is a simple bitter tonic which has been used very largely in domestic medicine and by the medical profession. It is very efficient as a tonic, is supposed to be particularly useful in the *anorexia* following malarial fevers, and has even been thought to possess antiperiodic power. In *simple dyspepsia* with *eructations* after meals, not due to gastritis, it is very serviceable.

In the treatment of *seat-worms* (*Oxyuris vermicularis*), or *thread-worms*, as they are often called, injections of the infusion of quassia are the most efficacious and useful remedial measures we possess, and are also very harmless to the patient. The bowel should be well washed out by soap and water, and ½ pint to a pint of an infusion, made by adding 1 or 2 ounces (32.0–64.0) of quassia chips to a pint (½ litre) of water, should be injected and retained for some minutes. A few such injections will invariably kill the parasites, provided the bowel is first well washed out with soap and water and enough fluid be injected to reach high up into the rectum.

Administration.—The tincture (*Tinctura Quassiæ, U. S.* and *B. P.*) is given in the dose of ½ a drachm to 1 drachm (2.0–4.0), the fluid extract (*Extractum Quassiæ Fluidum, U. S.*) ½ a drachm (2.0), and the extract (*Extractum Quassiæ, U. S.* and *B. P.*) 1 to 3 grains (0.05–0.15). The infusion (*Infusum Quassiæ, B. P.*) is given in the dose of ½ to 2 ounces (16.0–64.0), and is made by macerating 1 drachm (4.0) of quassia with 10 ounces (320.0) of water, and allowing it to stand twenty-four hours or more.

QUERCUS ALBA.

Quercus Alba, U. S., or White Oak, in infusion is used as an astringent injection in *gonorrhœa* and *vaginitis* in the female, where a large amount of fluid is necessarily employed. It is also used in *prolapse of the rectum*, in *hemorrhoids*, in *leucorrhœa*, and as a gargle in *sore throat*. It stains the clothing very slightly.

Quercus Tinctoria is equally efficient, but is seldom used, because it stains the clothes very badly. Either may be used in infusion of the strength of 1 ounce to the pint (32.0 : ½ litre). In the form of the powdered bark it is often used as an astringent poultice to freely *running sores* to check the discharge. *Decoctum Quercus* is official in the *B. P.*

RESIN, or ROSIN.

Resina, *U. S.* and *B. P.*, is Resin or Rosin, the mass left after the distillation of turpentine, and enters largely into plasters, cerates, and similar preparations. Its burning fumes when inhaled are said to be of value in cases of *chronic bronchitis*. *Ceratum Resinæ*, *U. S.*, is used in chilblains and superficial scalds, and *Emplastrum Resinæ*, *U. S.* and *B. P.*, is adhesive plaster. *Unguentum Resinæ* is a *B. P.* preparation used for the same purposes as the plaster or cerate.

RESORCIN.

Resorcin, *U. S.* (metadioxybenzol), is the *meta*-compound of the group of which hydrochinone is the *para*- and pyrocatechin the *ortho*-, and occurs in clear crystals of a slightly reddish hue. It is quite soluble in water, alcohol, and ether.

Physiological Action.—Resorcin is an irritant to mucous membranes, and when taken internally in poisonous doses causes deafness, giddiness, salivation, profuse sweat, unconsciousness, and clonic convulsions. The heart of the dog under its influence is at first slowed by vagal stimulation, and then becomes very rapid from vagal palsy.

Therapeutics.—Resorcin has been found of service as a remedy for *whooping cough*, given in the dose of 10 drops (0.65) of a 2 per cent. solution or used in a spray of the same strength, the latter being the better method of using the drug.

Resorcin has also been employed in a spray in 2 per cent. solution in *hay fever* with remarkably good effects. It has been used as an antipyretic, but is not serviceable and has little power over strong fevers.

The chief use of resorcin is in skin affections of a subacute or chronic character, such as *eczema* with much induration, and in *psoriasis*. In these states an ointment of the following character, well applied, is of service:

℞.—Resorcin . . . . ʒj (4.0).
Zinci oxidi . . . . ʒj (4.0).
Ung. aquæ rosæ . . . . ʒx (40.0).—M.
S.—Apply to the part affected twice a day.

After mixing the ointment heat it until the resorcin crystals melt, to prevent any irritation of the skin.

Resorcin is also of service in weak solution in allaying itching of the skin due to *erythematous eczema*. For this purpose it should be used in watery solutions of about 10 to 15 grains to the ounce, and a little salt added to aid in its absorption by the skin. This should be dabbed, not rubbed, on the part:

℞.—Resorcin	gr. xv (1.0).
Glycerin	♏x (0.65).
Liquor calcis	f℥j (30.0).—M.

In slowly spreading *epithelioma of the face* the following plaster, recommended by Hartzell, is useful:

℞.—Resorcin	gr. lxxii (5.0).
Ceræ flav. et pulv. resinæ	℥jss. (6.0)
Ol. olivæ	q. s.—M.

Within the last few years resorcin has been employed with good results in the treatment of *gastric ulcer* in the dose of 2 to 4 grains (0.1–0.2) before each meal in pill or capsule. It is supposed to act by reason of its analgesic, antiseptic, and hæmostatic power.

RHIGOLENE.

This is a product of petroleum obtained by repeated redistillation until the liquid resulting from this process boils at 64.4° F. It evaporates more rapidly than any other known liquid, except cymogene, which boils at 32° F., and is used in a spray for the production of localized numbness or freezing before *minor painful operations*, such as the use of the actual cautery.

RHUBARB.

Rheum, *U. S.* (*Rheum Radix*, *P. B.*), is the root of *Rheum officinale*, a plant of Thibet, but which is cultivated in America and elsewhere. It is also derived from China, and this variety is known as Chinese rhubarb. Several alkaloids are contained in it, all of which are unimportant and never used alone, except chrysophanic acid.

Physiological Action.—According to the studies of Prevost and Binet, rhubarb acts inconstantly upon the flow of bile, sometimes increasing it, sometimes having no effect, but, on the other hand, according to those of Rutherford and Vignal, it never fails to stimulate biliary secretion. Owing to the astringent properties possessed by rhubarb, it does not purge excessively, and improves the appetite, digestion, and intestinal tone.

Therapeutics.—Whenever it is desired simply to *unload the bowels* without affecting the general system rhubarb may be employed. In other words, it is useful in simple constipation. In children a state is very commonly seen in which *constipation* is replaced by diarrhœa if any ordinary laxative is employed, and in these instances rhubarb is the best remedy, as it is astringent and prevents any after-effects beyond those directly produced by the dose. In the *summer diarrhœa* of children, when the stools are green, rhubarb is often used to empty the bowels of fermentative products before direct treatment is instituted.

Rhubarb, because of its chrysophan, may stain alkaline urine carmine or acid urine yellow.

Administration.—The preparations of rhubarb are unnecessarily numerous. Rhubarb itself may be given in the dose of 20 grains (1.3) in powder, and small pieces of the root are habitually chewed by some persons for the relief of constipation. *Extractum Rhei, U. S.* and *B. P.*, is given in the dose of 5 to 10 grains (0.35–0.65) in pills. *Pilulæ Rhei, U. S.*, of which each pill contains 3 grains (0.25) of rhubarb, is given in the dose of one to three pills (0.05–0.25); and *Pilulæ Rhei Compositus, U. S.* and *B. P.*, which contain 2 grains (0.1) of rhubarb and 1½ (0.09) of aloes, are given in the same dose. *Pulvis Rhei Compositus, U. S.* and *B. P.*, contains rhubarb, magnesia, and ginger, and is given in the dose of 20 to 40 grains (1.3–2.6); *Extractum Rhei Fluidum, U. S.*, is given in the dose of 20 to 30 minims (1.3–2.0). *Syrupus Rhei, U. S.* and *B. P.*, is given in the dose of 1 drachm (4.0) to a babe, and 4 drachms (16.0) to an adult, although rarely used for older persons. *Syrupus Rhei Aromaticus, U. S.*, is given in the same dose and to the same class of cases. *Tinctura Rhei, U. S.* and *B. P.*, is used in the dose of 1 to 2 drachms (4.0–8.0), and *Vinum Rhei, B P.*, in the dose of 1 to 4 drachms (4.0–16.0). *Tinctura Rhei Aromatica, U. S.*, is used in the dose of ½ to 1 drachm (2.0–4.0), and *Tinctura Rhei Dulcis, U. S.*, 2 to 3 drachms (8.0–12.0). The aromatic spirit is commonly employed for children, and the compound pills for adults. *Infusum Rhei, B. P.*, is given in the dose of 1 to 2 ounces (32.0–64.0), and *Mistura Rhei et Sodæ, U. S.*, in the dose of 2 drachms to 3 ounces (8.0–96.0).

RHUS AROMATICA.

Sweet Sumac is unofficial, but has been so largely used of late that it deserves notice. In *hæmaturia*, *menorrhagia*, *diabetes insipidus*, and in *urinary incontinence* in children depending upon vesical atony it has been highly praised. In the latter affection a sufficient amount of experience has been acquired to show that it really is of benefit. Rhus aromatica should be used in the form of the fluid extract, derived from the bark of the roots according to the general directions in the Pharmacopœia for making fluid extracts. The dose as a remedy for *urinary incontinence* is 15 drops (1.0) of this preparation. Adults may take from 15 to 60 drops (1.0–4.0). The drug is best given with glycerin and water.

RHUS GLABRA.

Rhus Glabra, U. S., Smooth Sumac, is the fruit of *Rhus glabra*, and contains tannic and malic acids as its chief constituents of medicinal value. In the fluid extract (*Extractum Rhois Glabræ Fluidum, U. S.*) we have an official preparation which is very efficient as a gargle for *sore throat* when diluted with glycerin and water or prepared according to the formula given under Chlorate of Potassium.

ROCHELLE SALT.

Potassi et Sodii Tartras, U. S. (*Soda Tartarata, B. P.*), is largely used as a saline cathartic in the dose of ½ an ounce (16.0), and is preferred by many patients to Epsom salts because its taste is not so disagreeable. It is, however, more irritating. Rochelle salt is the purgative constituent of Seidlitz powder.

ROSA CENTIFOLIA.

Rosa Centifolia, U. S. (*Rosæ Centifolia Petala, B. P.*), Pale Rose, possesses almost no medicinal value, but is mentioned because its official preparations are largely used in practice.

Aqua Rosæ, U. S. and *B. P.*, is used as a diluent or solvent for preparations, such as astringents, which are to be employed locally, as in injections for *gonorrhœa.* It may also be used internally for these purposes. *Unguentum Aquæ Rosæ, U. S.*, is "cold cream," and is largely used as an emollient application to *small burns, sores, cuts, scratches*, and *chapped hands* and *lips.* It is much improved if a little glycerin and benzoic acid are added to keep it sweet in warm weather.

ROSA GALLICA.

Rosa Gallica, U. S. (*Rosæ Gallicæ Petala, B. P.*), Red Rose, contains more gallic and tannic acids than pale rose, and is astringent. From it are prepared the *Extractum Rosæ Fluidum, U. S.*, dose 5 drops to 2 drachms (0.35–8.0), used to flavor other extracts, and the *Confectio Rosæ, U. S.* and *B. P.*, which is used as a basis for pills. *Mel Rosæ, U. S.*, or honey of rose, is employed as a local application or as a vehicle for gargles, and the *Syrupus Rosæ, U. S.* and *B. P.*, dose 1 to 2 drachms (4.0–8.0), as a flavoring substance. The acid infusion (*Infusum Rosæ Acidum, B. P.*) is given in the dose of 1 to 2 ounces (32.0–64.0).

RUBUS IDÆUS, or RASPBERRY.

Rubus Idæus, U. S., or Raspberry, is used for the preparation of a syrup (*Syrupus Rubi Idæi, U. S.*) which is employed very largely as an elegant vehicle or flavoring mixture. The leaves are often used in domestic medicine in a decoction or infusion for the cure of *diarrhœa* when an astringent is needed.

RUE.

Ruta graveolens is the source from which we derive the Oil of Rue (*Oleum Ruta*, *B. P.*).

Physiological Action.—Locally applied, rue is an irritant, producing vesication, and if taken internally in large amount gastro-enteritis, which may be very severe. It is eliminated by the lungs, kidneys, and skin, and its odor is easily noticed in all these secretions. If the dose be poisonous, vomiting, great pain in the belly, and epileptiform convulsions come on, but death has rarely occurred.

Therapeutics.—Rue has been used as an abortifacient, but with great danger to the mother. Its action is most uncertain even when poisonous doses are employed. It has been given in *colic* as a carminative, and seems to be really valuable in atonic *menorrhagia* and *metrorrhagia*.

Given in capsule, oil of rue has been employed for the removal of *lumbricoid* or *round-worms*, but ought not to be so used. The dose of the oil is 3 to 6 drops (0.25–0.40).

SACCHARIN.

Saccharin is a compound first prepared by Fahlberg under the direction of Professor Remsen of Johns Hopkins University. It is a remarkably sweet substance, two hundred and twenty times stronger than sugar in sweetening power, and is used largely to sweeten glucose and in confections. It escapes from the body unchanged, and has been used in place of sugar in cases of diabetes and gout to sweeten coffee, food, or medicine.

The dose is indefinite, but it is to be noted that a very few grains will sweeten a very large bulk of material. As 1 grain (0.06) is equivalent to about 1 teaspoonful (16.0) of sugar, less than 1 grain is the quantity usually given. It is commonly sold in small tablets containing half a grain each (0.03).

Physiological Action.—Upon the circulation and similar vital functions saccharin has no effect, but Plügge has proved it to retard the action of all the digestive ferments, and to be in consequence harmful to diabetics whose digestion is impaired.

SALICYLATE OF BISMUTH.

Salicylate of Bismuth is a white, soft powder, insoluble in water, alcohol, ether, and chloroform, but soluble in acids. It is largely used by some practitioners, particularly on the European continent, as an intestinal antiseptic in cases where, in the presence of *gastro-intestinal catarrh*, fermentation or putrefaction is thought to be present in the bowel. It is to be given in powder, or, better still, in capsules, in the dose of 3 to 15 grains (0.25–1.0).

SALICYLATE OF MERCURY.

Salicylate of Mercury is a drug which has come into quite general use since the introduction of the hypodermic method of administering mercury in syphilis. It is to be suspended in paraffin oil in the proportion of 22 grains (1.5) of the salicylate of mercury to 3 drachms (12.0) of the oil, and before it is used the bottle must be well shaken in order that the insoluble mercury may not remain at the bottom. It is of great importance that the needle and syringe shall be thoroughly cleansed after each injection, as the insoluble drug readily clogs the opening of the instrument. At first 1 minim (0.05) of the mixture just named should be injected deeply into the gluteal region every fourth day, and this may be increased to every second day if no systemic evidences of the action of the drug appear.

SALICYLIC ACID.

Salicylic Acid (*Acidum Salicylicum*, *U. S.* and *B. P.*) occurs in fine white crystals or in fine white powder. It has a sweet yet acrid taste, and is derived from carbolic acid by treating it with caustic soda and carbonic acid at a moderate heat. Sometimes it is derived from plants in which it exists in combination, although the artificial acid is chiefly used. If the crystals are pinkish in hue, the acid should not be used, as it is probably impure. It is soluble in 500 parts of water and 4 parts of alcohol.

Physiological Action.—On mucous membranes salicylic acid acts as an irritant. (See Poisoning.)

NERVOUS SYSTEM.—Upon the nervous system salicylic acid exerts comparatively slight effects in medicinal doses, causing buzzing in the ears, decrease of the reflexes, and finally producing, in overdose, epileptiform convulsions by an action on the brain.

CIRCULATION.—Upon the circulation the effects of salicylic acid are not very marked in medicinal dose. It undoubtedly has a depressant rather than a stimulant effect, but the depression is very slight. It is sufficient, however, to make the use of the drug in cases of feeble circulation worthy of thought and care.

RESPIRATION.—Salicylic acid stimulates the pulmonary vagi and respiratory centre, but if the dose be poisonous death is due to respiratory failure.

TEMPERATURE.—The effect of salicylic acid on temperature has been studied by the author with a good deal of care. The drug acts as a distinct antipyretic upon fevered states, and is a slight depressant of normal bodily heat. The studies of Gedl, Fürbringer, and Sée also show this, and those of Danewsky point to it. In the experiments of North upon man, after and during exercise, the antipyretic effects were marked. According to the author's studies, the drug lowers fever by diminishing heat-production and increasing heat-dissipation, but this is by no means positively decided as a fact.

ABSORPTION AND ELIMINATION.—Salicylic acid is absorbed from the stomach as a salicylate of sodium, and so circulates in the blood. It is eliminated by the kidneys and by all the secretions. In the urine it appears as salicyluric acid. According to Kolbe, after a dose of 1 ounce (30.0) elimination does not commence for three hours, but Fleischer found the drug in the urine in one and a half hours. Usually, however, it is far more rapidly eliminated, and, as pointed out by Soullier, after a dose of 15 grains (1.0) it appears in the urine in ten to twenty minutes and after 30 grains (2.0) in five minutes. The elimination continues for a period of from thirty-three to fifty-six hours. (Weill). The urine after large doses is dark olive-green, and this change in color is due to the presence of indican and pyrocatechin, which are formed by the action of the pancreatic juices upon the drug in the intestine. The presence of salicyluric acid in the urine is to be discovered by the addition of a solution of the chloride of iron to that fluid, which causes the appearance of a violet color.

Poisoning.—Salicylic acid when taken in excessive dose causes profuse sweating, roaring in the ears, dimness of vision, headache, partial or total deafness, and a decided fall in temperature. The pulse becomes weak and relaxed, and finally ptosis, strabismus, and general paralysis ensue. The urine and fæces are passed involuntarily, and the urine is olive-green in color. The respirations at first are quickened and deepened, but finally become shallow and feeble, death ensuing from respiratory failure.

If the dose is sufficiently large, the blood is involved and the corpuscles rapidly break down.

Therapeutics.—Salicylic acid, owing to its close resemblance to quinine, was first introduced as an antiperiodic and antipyretic, but soon was found to be of an inferior value in these states and of superlative value in *rheumatism.* At present it is rarely if ever used for either of the former purposes, but is largely employed as a standard remedy for the latter trouble.

The value of salicylic acid in rheumatism limits itself solely to the relief of pain and the cure of the malady without preventing the complications incident to its course. That is to say, the changes in the joints or heart in rheumatism are only of less frequency after the use of salicylic acid because the drug shortens the disease, and not because it prevents these changes by a direct influence; this is also true of *rheumatic hyperpyrexia,* where salicylic acid is of service in shortening the attack, though it often fails to control the temperature to any great extent. In *acute rheumatism* 15 to 20 grains (1.0–1.3) should be given every four hours until marked physiological symptoms occur. Another method is to give 30 or 40 grains at 7 and 9 P. M., with a copious draught of milk, so that the main effects will be produced during sleep. It is to be remembered, however, that in many cases the salicylates are of no value whatever, merely producing sweats and headaches, and it is also worthy of note that nothing else does these cases much good, as they seem bound to run a given course before the patient recovers. If a cure does take place, relapses are very common indeed, and the drug should always be continued for several days after all symptoms cease. In *gonorrhœal rheumatism* salicylic acid is of little value until the gonorrhœa is cured, when the rheumatism also *ceases*, whether we give salicylates or not. In *rheumatoid arthritis* it is entirely valueless. The question as to the value of the salicylates in cases of *gout* is one open for debate. Some physicians regard it as useful, others as useless. Thus Duckworth states that in his experience and that of his friends the salicylates do not compare with *colchicum*. On the other hand, Sée, Jaccoud, and Haig find them useful. If they are of any value it is only when the dose is very large, and even then their usefulness seems to be doubtful. In *subacute rheumatism* citrate of potassium and sodium may be used in place of salicylic acid in the dose of 30 to 60 grains (2.0–4.0), and these salts are to be taken just before going to bed. In *lumbago, sciatica*, and similar states salicylic acid is a very useful remedy. While it is not as good as antipyrin in *neuralgia*, it is of great service in the *migraine* of rheumatic persons, often entirely curing the disease. Haig has proved that the salicylic compounds all aid in the excretion of uric acid, and thinks they relieve rheumatism in this manner.

Brunton has highly recommended the use of the salicylates with the bromides in the *nervous irritability* of gouty or lithæmic persons.

Salicylic acid has been largely used for the removal of pleural effusion if the effusion be serous. Dock believes that the duration of treatment is less with the salicylates than by the use of diuretics, alteratives, or purgatives, but the author has not reached good results from this plan of treatment. The dose should be from 1 to 2 drachms (4.0–8.0) daily. Doses larger than this are not necessary. How salicylic acid does good in pleural effusion we do not know, for its diuretic properties are not sufficiently great to drain away the liquid by this means.

In *quinsy* or true *tonsillitis* the drug is a specific, particularly when rheumatism is the cause. It will generally prevent suppuration, shorten the attack, and relieve the pain and swelling. The doses should be small, say 3 grains (0.25) at each dose, and given hourly. In *stomatitis*, after the blisters have broken, the burning and pain are often intense, and a mouth-wash of salicylic acid in the proportion of 1 to 250 of water is useful.

Ringer recommends the use of the following salve in *pruritus* of the anus and vulva:

℞.—Acid. salicylic.	ʒij (8.0).
Ol. theobromæ	ʒv (20.0).
Cetaceæ	ʒiij (12.0).
Ol. myristicæ	fʒiss (6.0).—M.

In the treatment of *corns* there is probably no better application than lint soaked in a solution of salicylic acid, or the use of the following formula:

℞.—Acid. salicylic.	gr. xxx (2.0).
Ext. cannab. indicæ	gr. v. (0.35).
Collodii	fʒss (16.0).—M.

S.—Apply with a brush until a good coat is formed.

A useful salve for the soreness following horseback or bicycle riding is one composed as follows:

℞.—Acid. salicyl.	gr. x. (0.65).
Adip. benzoinat.	℥j (32.0).—M.

S.—Apply to the sore part.

A solution of salicylate of sodium or of bicarbonate of sodium, applied on lint to *inflamed rheumatic joints*, often gives great relief. Smearing an ointment of salicylic acid over the joints not only produces good effects locally, but by absorption of the drug influences the disease. (See Rheumatism, Part IV.)

In *gastric dilatation* or *catarrh*, where vomiting occurs and the matters vomited contain *sarcinæ*, salicylic acid will be found of service, and Bartholow thinks it of value in paroxysmal *gastralgia*. In adults suffering from *ascaris lumbricoides*, or *round-worms*, salicylic acid may be used in the dose of 8 grains (0.6) every hour till 40 grains (2.65) are taken. This treatment should be followed by the use of a purge. For thread- or seat-worms the following injection will be found of service:

℞.—Acid. salicylic.	ʒss (2.0).
Sodii borat.	ʒss (2.0).
Aquæ	Oj (500.0).—M.

S.—Warm, and inject into the bowels. For a child reduce this one-half in all its parts.

In *bromidrosis* of the feet (excessive sweating with fœtor) salicylic acid may be dusted over the parts, or the following powder used:

℞.—Acidi salicylic. Pulv. amyl.	āā ℥ss (16.0).—M.

S.—Apply to the feet.

In *eczema* of the face and hands, where the eczema is of the wet or weeping variety, salicylic acid, locally applied, is often of great service.

℞.—Acidi salicylic.	gr. v vel x (0.3–0.65).
Pulv. amyli	ʒij (8.0).
Pulv. zinci oxid.	ʒij (8.0).
Petrolati	℥ss (16.0).—M.

S.—Apply locally.

If the eczematous process is subacute and needs stimulation, the salicylic acid may be increased to 20 or 30 grains (1.3–2.0).

Contraindications to the use of the salicylates are meningeal inflammation or congestion, middle-ear disease, albuminuria, inactivity of the kidneys, particularly as occurring in pregnancy, and Bright's disease.

Antiseptic Use.—Salicylic acid is employed as an antiseptic in the treatment of *wounds* as a local remedy and as a dressing, but should not be applied over too large an area, as it may be absorbed and produce constitutional symptoms. As an application to *small burns* a mixture of 1 drachm (4.0) of salicylic acid to 8 ounces (256.0) of olive oil is of service.

In the treatment of *soft chancres* and *venereal sores* salicylic acid has been largely used by some practitioners either as a salve or as a dusting-powder, as follows:

℞.—Acid. salicylic.	gr. xx (1.3).
Alcohol.	gtt. xlv (3.0).
Adipis benzoinat.	℥ij (64.0).—M.

℞.—Acid. salicylic.	gr. xv (1.0).
Pulv. amyli vel cretæ	ʒij (8.0).—M.

Salicylic acid may be added to urine to prevent its decomposition, but will sometimes cause the tests for sugar to appear. Patients taking salicylic acid often notice that the urine is odorless after standing, and that it will remain fresh for many days because of the salicylic acid present in it. It may cause the reaction of sugar in the urine in Trommer's test.

Untoward Effects.—Salicylic acid, as already stated, may produce headache and roaring sounds in the ears. In persons with middle-ear disease it is contraindicated unless urgently called for, as it often makes the deafness permanently worse. Sometimes erythema or acne follows its employment, and blindness and retinal hemorrhages have been found to occur. Strümpell asserts that delirium of an active character sometimes appears after full doses of salicylic acid, which delirium is usually happy in its type, and is seen most commonly in young girls. It would be impossible to enumerate all the untoward effects which have been noted, but it is worthy of remark that very few deaths have taken place.[1] Binz thinks that full doses of salicylic acid may produce abortion in women who already have a tendency to abort, and Vineberg thinks that menorrhagia and metrorrhagia are caused by it.

Administration.—Salicylic acid has a nauseous, disagreeable taste and is irritant to the stomach. It should be given in a solution of glycerin and water, or its taste may be covered by the use of syrup of bitter orange-peel or syrup of ginger. The following formulæ may be used:

℞.—Acid. salicylic.	ʒij (8.0).
Tinct. lavandulæ comp.	fʒiv (16.0).
Glycerini	f℥ss (16.0).
Aquæ	q. s. ad f℥viij (256.0)—M.

S.—A tablespoonful (16.0) every two hours.

Or,

℞.—Acid. salicylic.	ʒij (8.0).
Glycerini	f℥ss (16.0).
Syrup. aurantii	f℥iv (128.0).
Aquæ	q. s. ad f℥viij (256.0).—M.

S.—A tablespoonful (16.0) every two hours.

Salicylic acid may be used in pill or capsule, but is irritant to the stomach in so concentrated a form; it must be taken with much water, and should follow rather than precede meals.

If buzzing in the ears produced by this acid is annoying, bromide of sodium in the dose of 20 grains (1.3) will generally give relief.

Salicylic-acid ointment (*Unguentum Acidi Salicylici, B. P.*) is a useful preparation for external application in chronic, deep-seated skin diseases.

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[1] See author's Boylston Prize Essay of Harvard University on Antipyretics.

Salicylate of Methyl.

(See GAULTHERIA.)

Salicylate of Sodium.

Salicylate of Sodium (*Sodii Salicylas, U. S.* and *B. P.*) is a less irritant and somewhat less disagreeable preparation than salicylic acid. Its internal action, use, and doses are the same as those of the acid. It may be given by dissolving it in milk, and then adding rennet to produce a curd, which covers the taste and protects the stomach.

Other salicylates are largely used by some persons. Salicylate of lithium is supposed by some physicians to be of more value than the other salts.

SALOL.

In appearance, *Salol, U. S.*, is a white crystalline powder, faintly aromatic and almost without taste. It is not soluble in water, but is in alcohol, and an alcoholic solution forms an imperfect emulsion when mixed with water. Salol is also slightly soluble in copaiba, in the oils of sandalwood and of turpentine, and in mineral oils. This solubility is very useful in prescribing it with these remedies in certain diseases of the genito-urinary apparatus (See Gonorrhœa.)

Salol is a compound of 60 parts of salicylic acid and 40 of carbolic acid, and is decomposed by the pancreatic juice into these two substances. For this reason overdoses are capable of producing symptoms of carbolic-acid poisoning. Thus 20 grains of salol (1.3) taken five times a day will cause a man to take 40 grains (2.65) of carbolic acid, which is almost a poisonous dose.

Hesselbach has proved that salol is very apt to affect the kidneys unfavorably, and rightly believes it to be contraindicated in all cases of renal inflammation of an acute type.

It is worthy of note that the drug rarely produces untoward effects, although at one time a number of observers accused it of frequently doing so.

Salol is used for the same purposes as salicylic acid in the treatment of *rheumatism* when the stomach is irritated so that it cannot bear the latter drug, and it often acts well in these cases, as it is dissolved in the small intestine. A dose often used is 10 grains (0.65) an hour, but this is too much, as a rule, and may produce dangerous symptoms. Salol is also useful in *muscular rheumatism* and *neuralgia* due to exposure. In *pharyngitis* 5 grains (0.3) of salol, given three times daily, is a valuable part of the treatment of the affection, and in persons subject to chronic sore throat due to the uric-acid diathesis this treatment will often produce extraordinary results. It is of the greatest use in *duodenal catarrh* and *catarrhal jaundice*.

In the treatment of *gonorrhœa* in all its stages salol may be employed by the mouth, as in its elimination it sterilizes the urine and tends to disinfect or sterilize the urethra at each act of micturition. (See Gonorrhœa.)

Salol is of very great value in cases of *intestinal indigestion* and *fermentation*, and is sometimes used in cases of mild or *pernicious anæmia* when it is thought that the development of decomposition products is their cause. (See Anæmia.) In *diarrhœa* dependent upon such causes salol is one of the best remedies we have, since it renders the intestinal canal antiseptic, and so removes the cause of the disorder, instead of locking the putrid material in the bowel, as does opium. In *cholera morbus* the writer's friend, Dr. Fussell of Philadelphia, has found the following very useful:

R.—Salol . . . . ʒj (4.0).
Bismuth. subnitrat. . . . . ʒij (8.0).
Misturæ cretæ . . . . q. s. ad f℥iij (96.0).—M.
S.—Two teaspoonfuls (8.0) every two hours.

Wide experience with the drug in the treatment of *cholera* during recent epidemics has proved it to be one of the best remedies we can employ in the treatment of this disease.

Salol may be given in wafers, capsules, or pills.

SALOPHEN.

Salophen has been introduced into medicine as a substitute for salol, and is said to possess the advantage of being far less poisonous than salol, because in this case the phenol of the salol is replaced by a compound of phenol which is innocuous. Experiments on animals seem to indicate that these theoretical advantages are present in fact. Like salol, salophen is broken up in the intestine by the juices there present, and the result is salicylic acid and acetylparamidophenol. Salophen contains about 10 per cent. less salicylic acid than does salol (51 per cent.), and appears in the form of thin, white laminæ nearly insoluble in water. It is tasteless.

Therapeutics.—For the therapeutics of salophen the reader is referred to the article on Salol, as the indications for both drugs are identical, save that salophen can probably be used when salol cannot be employed. The dose of salophen is from 5 to 20 grains (0.35–1.3) three times a day. It can be very effectually combined with phenacetin in the treatment of *neuralgia*. In *subacute rheumatic* affections it is certainly very useful.

SANDAL-WOOD OIL.

Sandal-wood Oil (*Oleum Santali*, *U. S.* and *B. P.*) is derived from the wood of *Santalum album*, a tree of India, and has a hot, burning taste. The odor is very pleasant, and the oil has been used as a perfume. In overdose the oil is capable of producing great irritation of the genito-urinary passages.

Therapeutics.—The oil of sandal-wood is much used by genito-urinary surgeons in *chronic gonorrhœa* and *gleet* for the purpose of stimulating depraved mucous membranes to proper action, and in *chronic cystitis* to act as a tonic to the bladder.

In the subacute or later stages of *bronchitis*, when the expectoration is thick and ropy and the cold is not readily "thrown off," the oil of sandal-wood is efficacious. Dr. Daggett strongly recommends its use in cases of *asthma* associated with marked catarrhal symptoms, and in the *excessive cough* following influenza it is of great value. In all cases it should be given in capsules in the dose of 5 to 20 drops (0.35–1.3), 5 drops (0.35) being generally sufficient, although druggists generally keep it in 10-minim (0.65) capsules. Oil of sandalwood may irritate the stomach, but it is not so apt to do so as are cubebs or copaiba.

SANGUINARIA.

Sanguinaria, U. S., or Blood-root, is the rhizome of *Sanguinaria canadensis*, and has been largely used in medicine, but is a dangerous remedy, possessing more power for harm than good. Its chief alkaloid is sanguinarine.

Poisoning.—Sanguinarine in poisonous dose causes vomiting, purging, profuse salivation, and finally tonic convulsions which are spinal in origin. Death is due to respiratory failure, but the circulation is much decreased in force and frequency.

Therapeutics.—The employment of sanguinaria in *chronic bronchitis* is about the only purpose for which it is now employed to any extent. As an emetic in *croup* it has been largely used, but is too irritant and depressant, and ought not to be so employed. According to Bartholow, the drug acts as an *hepatic stimulant*, and is of service in *gastro-intestinal catarrh* with *jaundice*.

Administration.—The dose of the fluid extract (*Extractum Sanguinariæ Fluidum, U. S.*) is 1 to 5 drops (0.05–0.35) as an expectorant, or 10 to 30 drops (1.0–2.0) as an emetic. If the drug does not cause vomiting after an emetic dose, it must not be allowed to remain in the stomach, as it is poisonous. The tincture (*Tinctura Sanguinariæ, U. S.*) is the best preparation to use, and may be given in 20- to 30-drop doses as an expectorant, and 1 to 3 drachms (4.0–12.0) as an emetic. The vinegar (*Acetum Sanguinariæ*) is no longer official, but is given in the dose of 10 to 30 drops (0.65–2.0), and as an emetic in the dose of 2 to 4 drachms (8.0–16.0).

SANTONIN.

Santoninum, U. S. and *B. P.*, is a neutral principle derived from Levant Worm-seed or Santonica, which is the unexpanded flower-heads of *Artemisia pauciflora*, a plant of Asia Minor and Turkestan. Santonin is soluble in alcohol and chloroform, but less so in water. Santoninic acid is formed by warming santonin with alkalies, and Hesse has found that santonin is an anhydride of santoninic acid. Santoninic acid is more soluble than santonin.

Poisoning.—Santonin causes, when taken in overdose, muscular tremors, convulsive movements, unconsciousness, and sometimes epileptiform convulsions.

One of the most common symptoms of the poisoning is chromatopsia or xanthopsia, during the existence of which all objects look yellow. This is due to the staining of the humors of the eye by the drug. This may go on to total blindness or pass away in a few days. If the vision is not yellow, it may be green. The urine is also stained—first yellow, then saffron, and finally purple-red, or is bloody-looking. This is not due to the presence of blood, but to the drug. Poisonous doses of the drug do *not* cause gastro-enteritis.

Therapeutics.—Santonin is used for the removal of the *round-worm*, and is very efficacious. It has no influence on the tape-worm. It should be given in the manner of all vermifuges (see Worms)—namely, at a time when the alimentary canal is empty. Santonin is said to have a distinct influence over vision, increasing, in medicinal amount, its acuity whenever the optic nerve is at fault. In *urinary incontinence* santonin will often produce a cure after all other remedies fail.

Santoninate of sodium (*Sodii Santoninas*) is a useless, harmful preparation, never to be employed except for the benefit of the eye when vision fails through disease of the optic nerve. Introduced into medicine because of its solubility, it is absorbed into the system, which is just what is least desired in an anthelmintic, which should seek the worm in the bowel, not by entering the blood. In eye affections the dose may be from 2 to 8 grains (0.1–0.6) a day, according to the age of the adult.

Santonin may also be given in the dose of 1 to 2 grains (0.05–0.1) to an adult in capsules or wafers. The crystals should be used, not the powdered santonin. If the bowels are not opened within ten hours after the drug is used, a saline purge should be given, preceded preferably by a 2- or 3-grain (0.1–0.15) dose of calomel, taken half an hour before, as the flow of bile caused by the mercurial is particularly useful in making the worm let go its hold.

Untoward Effects.—In addition to the curious effects already named santonin may cause urinary incontinence even in medicinal dose.

Administration.—Santonin is best given in the form of a troche or lozenge (*Trochisci Santonini, U. S.* and *B. P.*), but it is to be distinctly borne in mind, and written on the prescription, that the *Trochisci Sodii Santoninatis* of the *U. S. P.* of 1880 are not to be sold to the patient. The troches of santonin itself are now official in the *U. S. P.*, but if the physician prefers to write for troches, they can be made as follows:

℞.—Santonini	gr. v (0.3).
Pulv. sacchari alb.	℥iij (12.0).
Pulv. acaciæ	gr. viij (0.5).
Misce bene, et adde	
Acaciæ mucilag.	gtt. xvj (1.0).
Aquæ	q. s.
Ft. in troches No. x.	

S.—One or two lozenges, as directed.

SARSAPARILLA.

Sarsaparilla, U.S., is the root of *Smilax officinalis, Smilax medica*, and other species of Smilax, growing chiefly in Central America. It is known in the *B. P.* as *Sarsæ Radix*. The drug is devoid of any physiological action, yet seems to possess some power over the general condition of the system. Thus while sarsaparilla seems utterly without effect in the hands of most physicians when given alone, it often seems to do good and to increase the effects of other drugs when combined with them, so that some cases of syphilis which are of an obstinate character will yield to iodide of potassium and sarsaparilla when the iodide alone fails. Sarsaparilla is largely used in domestic medicine as a "blood-purifier," and is a prominent constituent of many patent medicines. It is useless for such purposes.

Administration.—Sarsaparilla is most commonly given in the form of the compound syrup (*Syrupus Sarsaparillæ Compositum, U. S.*), composed of sarsaparilla, sassafras, guaiacum-wood, liquorice, pale rose, gaultheria, anise, and senna, dose 1 to 4 fluidrachms (4.0–16.0). (See Iodide of Potassium.) The other official preparations of the *U. S. P.* are the compound decoction (*Decoctum Sarsaparillæ Compositum*), composed of the same principal ingredients as the compound syrup, except that anise, senna, pale rose, and mezereum are omitted, dose 4 to 6 fluidrachms (16.0–24.0); the compound fluid extract (*Extractum Sarsaparillæ Fluidum Compositum*), similar to the syrup in composition, dose ½ to 1 fluidrachm (2.0–4.0); and the fluid extract (*Extractum Sarsaparillæ Fluidum*), dose ½ to 1 fluidrachm (2.0–4.0). The *B. P.* preparations are—a decoction (*Decoctum Sarsæ*), dose 2 to 10 fluidounces (64.0–320.0); a compound decoction (*Decoctum Sarsæ Compositum*), which is identical with the decoction of the *U. S. P.;* and a liquid extract (*Extractum Sarsæ Liquidum*), dose ½ to 4 fluidrachms (2.0–16.0).

SAVINE.

Sabina, U. S. (*Savinæ Cacumina, B. P.*) is the tops of the *Juniperus Sabina*, an evergreen shrub of Northern Europe, Asia, and America. It contains an official volatile oil (*Oleum Sabinæ, U. S.* and *B. P.*). Locally applied, it is more of a counter-irritant than is turpentine, and if swallowed in poisonous amount causes nausea, vomiting, gastroenteritis, unconsciousness, suppression of urine, and death. If the individual be a pregnant female, abortion takes place as death approaches, but very rarely before this time. Profuse flooding nearly always accompanies the act.

Therapeutics.—The oil, taken in the dose of 5 to 10 drops (0.35–0.65), repeated every three or four hours, acts as a powerful stimulant to the uterus and ovaries, causing hyperæmia and aiding in the production of menstruation in cases of *amenorrhœa*. It may also be employed with advantage in some cases of *menorrhagia*. The drug is best given in emulsion or capsule. The fluid extract (*Extractum Sabinæ Fluidum, U. S.*) is given in the dose of 5 to 15 minims (0.35–

1.0); the tincture (*Tinctura Sabinæ, B. P.*) in the dose of 20 minims to 1 drachm (1.3–4.0). The ointment (*Unguentum Sabinæ, B. P.*) is used as an external application to irritate the skin.

SCAMMONY.

Scammonium, U. S. and *B. P.*, is a resinous exudate from the root of *Convolvulus Scammonia*, growing in Asia Minor and Syria. Its active principle is sometimes called jalapin.

Therapeutics.—Scammony is an irritant, drastic, hydragogue purge, which causes a good deal of griping and exerts a cholagogue effect. If an inflammatory condition of the bowels is present its use is contraindicated.

The ingestion of poisonous doses is to be followed by treatment suitable for gastro-enteritis. Scammony is given in the dose of 2 to 5 grains (0.1–0.35), always in combination with some other similar drug—as, for example, colocynth. Scammony forms part of the compound extract of colocynth (*Extractum Colocynthidis Compositum, U. S.*), the dose of which is 1 to 3 grains (0.05–0.15) as a laxative or 5 to 20 grains (0.35–1.3) as a purge. The resin (*Resina Scammonii, U. S.* and *B. P.*) is given in the dose of 3 to 8 grains (0.15–0.6). The *B. P.* preparations of scammony are *Mistura Scammonii*, dose ½ to 2 ounces (16.0–64.0); *Confectio Scammonii*, dose 10 to 30 grains (0.65–2.0); *Pilula Scammonii Composita*, dose 5 grains (0.35); and *Pulvis Scammonii Compositus*, dose 10 to 20 grains (0.65–1.3). The last two preparations are composed of scammony, ginger, and jalap.

SCOPOLAMINE.

Scopolamine is an alkaloid derived from *Scopolamia atropoides*, a plant of Southern Europe, which possesses medicinal powers closely resembling those of belladonna and its sister drugs. Its physiological action is very closely allied to that of hyoscine, one of the alkaloids of hyoscyamus, and, as stated in the article on Hyoscine, it is probable that much so-called hyoscine is scopolamine.

Therapeutics.—Scopolamine is used in medicine chiefly by ophthalmic surgeons, and in the eye is far less irritating than either of the alkaloids of hyoscyamus or atropine. Indeed, it may be considered as being distinctly sedative in *plastic iritis*. Its effects are not, however, so lasting as are those of atropine. The use of $\frac{1}{480}$ of a grain dropped into the eye in one dose produces a mydriasis in eighteen minutes and ciliary paralysis in twenty-three minutes. This mydriasis lasts about seventy-two hours, and the ciliary paralysis about ninety-six hours (Oliver). It finds its greatest usefulness in the early stages of *iritis*, when a rapidly-acting and efficient sedative mydriatic is demanded.

Scopolamine is best used for this purpose in the strength of $\frac{1}{10}$ of 1 per cent. (1 : 500) in water.

This solution may be dropped into the eye every twenty minutes till one hour has elapsed. As this use of the drug is slightly painful it is well to place a few drops of cocaine solution in the eye before each instillation of scopolamine.

Internally scopolamine acts as a fairly powerful soporific in *nervous insomnia*, and in the sleeplessness of *mania*, and even when dropped into the eye its general systemic effect is soporific.

Scopolamine itself is rarely employed, the hydrobromate of scopolamine being preferable. It also occurs as the hydriodate and hydrochlorate.

The dose of these salts of scopolamine varies from $\frac{1}{200}$ to $\frac{1}{60}$ of a grain (0.0003–0.001) by the hypodermic needle or the mouth.

SCOPARIUS AND SPARTEINE.

Scoparius, *U. S.* (*Scopari Cacumina*, *B. P.*), or Broom, is the tops of the *Cytisus Scoparius*. It contains scoparin and sparteine, the first being a crystalline principle and the second a liquid alkaloid. The second (sparteine) is the alkaloid used in medicine in the form of a sulphate (*Sparteinæ Sulphas*, *U. S.*), which is a crystalline salt readily soluble in water.

Physiological Action.—As scoparius depends for its medicinal value almost entirely upon sparteine, what is here said applies to both the crude drug and the alkaloid.

NERVOUS SYSTEM.—Sparteine acts on the nervous system very decidedly if given in large dose, depressing the brain and spinal cord, chiefly in its motor tracts, thereby causing a decrease of reflex action and motor power, ending in complete paralysis. These changes occur both in man and in the lower animals. The heart is said to be stopped in systole.

CIRCULATION.—Upon the circulation sparteine acts as a stimulant. It quickens the pulse-rate in moderate doses, and also raises arterial pressure. The force of the contraction of the ventricles is also increased. In very large poisonous doses the drug acts as a circulatory depressant.

RESPIRATION.—Upon this function in small amounts sparteine has no effect, but poisonous doses kill by paralysis of the respiratory centre.

Poisoning.—The symptoms of poisoning consist in trembling and inco-ordination of movement, and clonic and tonic convulsions, followed by a second stage of depression of the nervous system and general enfeeblement.

Therapeutics.—Sparteine has been recommended in all states of the heart in which digitalis is of service, and it is sometimes useful in those fairly frequent cases where digitalis fails. In *cardiac arhythmia* or *palpitation* it is thought to be of great service by those who have used it most. Clark found it of value in *Graves's disease* and in nearly every circulatory abnormality, but in the judgment of the author of this book sparteine is not a very useful drug—one only to be turned to as a last resource after more generally known remedies fail; or, in other words, it is not a remedy to be used as a "stand-by" in the manner in which digitalis is employed.

While some clinicians have found sparteine of value, many of them have not. In the few cases in which it has been used by the writer it entirely failed to be of service, perhaps because the cases were desperate and the drug was tried after all the other remedies had failed. The dose is as variable as its action. Some state it to be $\frac{1}{20}$ of a grain (0.003), while still others recommend 2 to 4 grains (0.1–0.2). A small dose should be used at first, and rapidly increased until some effects ensue. To get the best effects it should be given every two hours in the dose of $\frac{1}{4}$ of a grain. The drug should be given in watery solution.

Potts claims to have found sparteine of value in the treatment of tremor, as in *paralysis agitans*, in the dose of $\frac{1}{4}$ to $\frac{1}{2}$ grain (0.015–0.025) three times a day.

Scoparius itself is used in decoction, made by adding $\frac{1}{2}$ an ounce (16.0) of the broom-tops to a pint ($\frac{1}{2}$ litre) of water, and boiling them down to a $\frac{1}{2}$ pint (250 cc.). Of this, an ounce should be taken every three hours. This decoction is one of the most efficient diuretics in *cardiac dropsy*. An official fluid extract (*Extractum Scoparii Fluidum*, *U. S.*) is given in the dose of 30 drops (2.0). The official preparations of the *B. P.* are—a decoction (*Decoctum Scoparii*), dose 1 to 3 ounces (32.0–96.0), and the juice (*Succus Scoparii*), dose 1 to 2 drachms (4.0–8.0).

SEIDLITZ POWDER.

Under the official name of *Pulvis Effervescens Compositus* the *U. S. P.* recognizes a purgative powder (*Seidlitz Powder*, *B. P.*) made by taking the bitartrate of sodium and potassium, or Rochelle salt, 120 grains, and bicarbonate of sodium 40 grains, which are wrapped in blue paper, and 35 grains of tartaric acid placed in a white paper. The contents of each paper are dissolved in a little water—half a tumblerful—and the two solutions added to one another and swallowed during effervescence. As much as two powders may be used, but this is generally too large an amount unless full purgation is needed. In *sick stomach* associated with *constipation*, when a whole powder cannot be retained, the two powders should be divided into fourths, and a fourth added to a fourth dissolved in a half-wineglassful of water and taken every fifteen minutes until the entire powder is ingested. This will often settle the stomach and produce purgation.

SENEGA.

Senega, *U. S.* (*Senegæ Radix*, *B. P.*), is the root of *Polygala Senega*, a small plant of the United States, containing a principle known as polygalic acid and senegin.

Therapeutics.—Senega is used in medicine as a stimulating expectorant in the subacute and chronic forms of *bronchitis*. It has also been employed as a diuretic in *cardiac dropsy* or that due to renal disease. In cardiac disease it should not be used, and indeed it is rarely employed at present except in combination with other drugs in expectorant mixtures.

Administration.—Senega is used in the form of the fluid extract (*Extractum Senegæ Fluidum, U. S.*), dose 10 to 20 drops (0.65–1.3), and the syrup (*Syrupus Senegæ, U. S.*), dose 1 to 2 drachms (4.0–8.0). It is also used in Coxe's Hive Syrup. The official preparations of the *B. P.* are—a tincture (*Tinctura Senegæ*), dose 1 to 2 drachms (4.0–8.0), and an infusion (*Infusum Senegæ*), dose 1 to 2 ounces (32.0–64.0).

SENNA.

Senna, U. S., is the most drastic of the laxative purges used for the relief of *constipation*. It is the leaflets of *Cassia acutifolia* and *Cassia angustifolia*, and contains a very acrid irritant purgative principle known as cathartic acid. Senna is official in the *B. P.* as *Senna Indica* and *Alexandrina*.

Physiological Action.—Senna acts as a purge, producing copious stools, often with a great deal of griping if it is used alone. According to Rutherford and Vignal, it acts very materially in increasing the flow of bile, but it is seldom, if ever, used in medicine as a cholagogue, although, according to Prevost and Binet, cathartic acid has an influence over biliary secretion. Hess has found that the drug acts directly as a stimulant upon the mucous membranes, and so produces a local peristalsis as it is moved along. It is also known that the drug is eliminated in the milk, and for this reason care should be taken in giving the drug to nursing mothers, as it will purge the nursling.

Administration.—Senna is generally combined with other drugs for the relief of constipation, but may be used alone. If this is done, the fluid extract (*Extractum Sennæ Fluidum, U. S.*) may be employed in the dose of 1 to 2 drachms (4.0–8.0) to a child or 4 drachms (16.0) to an adult. It is, however, always better to give children the more agreeable confection (*Confectio Sennæ, U. S.* and *B. P.*) in the dose of ½ drachm (2.0) to a child or 1 to 2 drachms (4.0–8.0) to an adult. As the confection is apt to cause gastric disorder if used continuously because of the sugar contained in it, its use is limited to a certain class of cases.

In the treatment of the *constipation of pregnancy* senna is thought to be very useful. In these cases and in others when cascara sagrada alone will not move the bowels, senna may be prescribed as follows:

R.—Ext. sennæ fluid. . . . . f℥ij (60.0).
Ext. cascaræ sagradæ fl. . . . . f℥j (30.0).—M.
S.—Teaspoonful (4.0) at night, or night and morning.

Should this produce griping ½ to 1 minim (0.025–0.05) of fluid extract of belladonna may be added to each dose. Under the name of Black Draught a mixture of senna, manna, and sulphate of magnesium has been largely used (*Infusum Sennæ Compositum, U. S.*) in the dose of 4 ounces (128.0). It is an active hydragogue purge. The syrup

(*Syrupus Sennæ, U. S.* and *B. P.*) is given in the dose of 1 to 4 drachms (4.0–16.0).

One of the best ways to use senna is in the compound liquorice powder (*Pulvis Glycyrrhizæ Compositus, U. S.* and *B. P.*), which is a good laxative in the dose of 20 to 30 grains (1.3–2.0). Compound liquorice powder is composed of senna, liquorice, oil of fennel, washed sulphur, and sugar.

Infusum Sennæ, B. P., is given in the dose of 1 to 2 ounces (32.0–64.0); *Mistura Sennæ Composita, B. P.*, in the dose of 1 to 2 ounces (32.0–64.0), and *Tinctura Sennæ, B. P.*, in the dose of 1 to 4 drachms (4.0–16.0).

Senna, because of its chrysophan, may stain the urine carmine if that fluid is alkaline, or yellow if it is acid. No alarm should be felt if the color appears in this secretion. Often it is necessary to warn the parents of a child of the possibility of such an occurrence, in order to prevent any fright on the part of the mother, who otherwise might think that hæmaturia was present.

SERPENTARIA.

Serpentaria, U. S. (*Serpentaria Rhizoma, B. P.*), or Virginia Snakeroot, is the rhizome and rootlets of *Aristolochia Serpentaria* and *Aristolochia reticulata*, plants of the Southern United States. It contains an active principle, aristolochin, which is never used in medicine.

Therapeutics.—Owing to the rather pleasant, warm taste of serpentaria, and the fact that it stimulates secretion, it is used largely as a vehicle for other more potent remedies. It has tonic properties, and in consequence has been largely used in the treatment of atonic dyspepsia and indigestion. It is even said to be a sexual stimulant, but this is doubtful, to say the least. In overdose it is an irritant, and will cause vomiting and purging if large amounts are taken.

Administration.—Serpentaria is given in the form of the fluid extract (*Extractum Serpentariæ Fluidum, U. S.*) in the dose of 10 to 40 drops (0.65–1.3), and the tincture (*Tinctura Serpentariæ, U. S.* and *B. P.*) in the dose of ½ to 2 drachms (2.0–8.0). It also enters into Huxham's Tincture of Cinchona (*Tinctura Cinchonæ Composita, U. S.* and *B. P.*). *Infusum Serpentariæ, B. P.*, is given in the dose of 1 to 2 ounces (32.0–64.0).

SILICATE OF POTASSIUM OR SODIUM.

Soluble Glass, or Silicate of Potassium or Sodium, occurs as a clear syrupy fluid, and is not official. It is used as a splint in the dressing of *fractures* and *sprains*, as it rapidly becomes hard and immovable when painted over the bandages. Silicate of potassium or sodium may be universally substituted for plaster of Paris. The silicate of sodium is official as *Liquor Sodii Silicatis, U. S. P.*

SOAP.

Sapo, U. S. (*Sapo Duris, B. P.*), is prepared from any alkali and fixed oil, although soda and olive oil are most frequently employed in the manufacture of the soaps which are used medicinally. Castile soap, if good, is the best representative of a pure soap that we have.

Soap may be cut into the form of a suppository and used to provoke movements of the bowel in young children who are suffering from constipation by placing it just inside the anus, having previously dipped it into water one instant to make it slippery. It may also be used as an enema, dissolved in warm water, or a mixture known in Philadelphia as the "House Mixture" may be employed in the case of an adult. This consists of a mixture of water, soft-soap, and molasses in varying proportions, and if *flatulence* is present turpentine and olive oil are added to it. The preparation is as efficient as it is cheap and dirty. Soap is also used as an antidote to many poisons and as an aid to emetics.

Green Soap (*Sapo Mollis, U. S.* and *B. P.*) is not generally green, but brown. It is a soft soap made by the use of potash and olive oil, and is largely used by dermatologists in the treatment of *eczema* and similar skin diseases where a detergent, stimulating application is needed. It is sometimes called "German soft soap," to separate it from the ordinary soft soap, or the common sapo mollis, of this country, which is an impure substance often made of rancid fats, containing a large excess of alkali and never used except for scouring purposes. Green soap is not commonly employed as green soap, but in the liniment (*Linimentum Saponis Mollis, U. S.*), which is to be thoroughly rubbed into the part when used medicinally, well washed off, and afterward simple cerate or some other soothing salve applied.

Soap Liniment (*Linimentum Saponis, U. S.* and *B. P.*), or Opodeldoc, as it is called in domestic medicine, is largely used for rubbing *stiff muscles* and *sprains*. It is generally employed to carry more active external remedies, such as opium or aconite.

℞.—Tinct. aconiti
Tinct. belladonnæ } . . . . āā f℥ij (8.0).
Tinct. opii
Liniment. saponis . . . . q. s. ad f℥vj (192.0).—M.

Soap Plaster (*Emplastrum Saponis, U. S.*) is used as a thick, heavy protective for *bed-sores* or where bed-sores are feared. It is also used as a support about *sprained joints*.

SODIO-SALICYLATE OF THEOBROMINE.

This compound, known as *diuretin* (or sodio-theobromine-salicylate), derives its name from the extraordinary power which it is said to possess of producing a great increase in the urinary flow from the kidneys. This power depends entirely upon the theobromine, which is a crystallizable, bitter, and volatile alkaloid, closely allied to caffeine and xanthine, and derived from the seeds of Theobroma Cacao, or the source of ordinary chocolate. Owing to the insolubility of theobromine, it has been found necessary to combine it with sodium salicylate, as under these conditions it is readily absorbed.

The diuretic properties of this alkaloid were first discovered during a series of experiments made by Schröder in Strasburg in 1889, who found that the diuresis produced in man and the lower animals was very marked. A large number of clinical trials in Europe and America have confirmed his observations, but there are a number of cases in which it signally fails, particularly in chronic Bright's disease.

Theobromine does not have so stimulating an effect on the heart as does its relative caffeine, so that the circulatory effect, while showing a stimulant rather than a depressing tendency, is very slight. It slightly increases muscular power, but its peculiar affinity for the renal structures surpasses all its other activities.

As the action of the drug depends upon its ability to stimulate the secreting epithelium of the kidney, the physician should remember that in cases of advanced renal disease, where the secreting structures are almost entirely destroyed, no result can be expected from its administration; but it is probable that the drug is useful in almost all conditions of dropsy, whether due to renal inactivity or cardiac disease, and is harmless to the patient even if the diuretic effect does not ensue. The only contraindication to the use of theobromine or diuretin is the presence of acute nephritis, when, of course, sedatives rather than stimulants are needed. So far as the writer is aware, no study as to the proportion of solids and liquids in the urine under the influence of this drug have been made, but the fact that it stimulates the epithelium or secreting structures of the kidney would indicate that the solids are increased.

As diuretin only contains from 30 to 50 per cent. of theobromine, it has to be given in very large amounts, as much as 1 to 2 drachms (4.0–8.0) in twenty-four hours, preferably in divided doses of from 10 to 20 grains (0.65–1.3) in capsule or in warm water. The former method is the better, as the taste of the drug is disagreeable and soapy.

It must not be exposed to the air, as it undergoes decomposition.

In all the cases in which the writer has tried sodio-salicylate of theobromine he has failed to see any effect produced, and, while he has no confidence in the drug, he mentions it because others claim to have obtained good results from its use.

SODIUM.

Sodium is a metallic element, the salts of which are usually white and colorless. It is not used in medicine, but many of its salts are employed. While potassium acts as a depressant to the body, sodium seems to exert comparatively little effect upon the animal economy. The salts vary in their power with the acid forming them. (See Benzoate of Sodium, Chloride of Sodium, Salicylate of Sodium, etc.)

Acetate of Sodium (*Sodii Acetas, U. S.* and *B. P.*) is rarely if ever used in medicine as a substitute for acetate of potassium. The dose is 20 to 40 grains (1.3–2.65) three times a day.

SODIUM ETHYLATE.

Sodium Ethylate is a whitish powder, decomposed in the presence of water into alcohol and caustic soda, but soluble in absolute alcohol without decomposition.

Sodium ethylate is employed in medicine as a depilatory—that is, for the purpose of removing *hairy growths*. To accomplish this purpose it is necessary that the growth be clipped close to the skin, and that the drug be dissolved in absolute alcohol and applied over the roots of the hair with a glass rod.

Soon after this application a crust forms, which should not be detached for two or three weeks, but which, on its removal at the end of this time, generally shows that all the roots of the hair have been destroyed. If not, the operation may be repeated as soon as the skin is in a condition to bear it. To prevent pain, a 5 per cent. solution of cocaine may be used hypodermically at the spot to be cauterized. It is worthy of remembrance that moles and small birthmarks, or nævi, may be relieved by a similar application.

SODIUM HYPOSULPHITE.

Hyposulphite of Sodium, or Thiosulphite of Sodium, occurs in large, transparent, colorless plates which effloresce when exposed to the air. It has slight alkaline reaction, is soluble in about equal parts of water, but insoluble in alcohol.

Therapeutics.—Hyposulphite of sodium is used in the proportion of 1 drachm (4.0) to the ounce (32.0) of water or lard in the treatment of parasitic skin diseases, particularly those due to the tricophyton fungus, such as *pityriasis versicolor*. It is also very useful, locally applied, in poisoning from poison ivy, and in cases of *pruritus* due to other causes, in the strength of ½ a drachm (2.0) to the ounce (32.0) of water. In *malarial hæmaturia* hyposulphite of sodium is often given with advantage in the dose of from 10 to 30 grains (0.65–2.0) every four hours. How it acts in this condition we do not know.

SODIUM SULPHATE.

Sodii Sulphas, U. S. and *B. P.*, or Glauber's salt, is one of the most irritant of the saline purges, rarely used in medicine for human beings, but largely employed by veterinarians. The purgative dose for man is half an ounce to an ounce (16.0–32.0). If any intestinal inflammation is present, it is contraindicated. It produces large watery stools, with a good deal of griping. Sulphate of sodium is a prominent constituent of Carlsbad water, Hunyadi Janos, Hunyadi Arpad, and similar waters. (For an explanation of the action of salines in producing purgation, see Magnesium Sulphate.)

Reverdin has recently claimed that small doses of 2 grains (0.1) of sulphate of sodium every hour are of great value in controlling *capillary hemorrhages* and for *graver hemorrhages*. It must be given by the mouth or intravenously. If given hypodermically he asserts it is useless.

SOLANUM CAROLINENSE.

Solanum Carolinense, or Horse Nettle, is a low perennial plant of the natural order *Solanaceæ*, a native of the South-eastern United States.

According to some studies made by Thornton the drug depresses the cerebrum, but excites the spinal cord. It has been introduced into medicine for the purpose of relieving *epilepsy*, particularly when the disease occurs in childhood. In a limited employment of the drug the writer has found it very serviceable in diminishing the frequency and severity of the attacks. The beginning dose of the fluid extract is 15 to 60 minims (1.0–4.0) three times a day, but it can be increased to as much as a drachm at a dose with advantage.

SOMNAL.

Somnal is stated to be ethylated chloral-urethan, and seems to possess marked hypnotic power. It is a clear, colorless liquid of a hot, burning taste, resembling sweet spirit of nitre. The dose is 20 to 40 drops (1.3–2.6) in liquorice-water or syrup of raspberry, and the sleep produced by it is said to last seven to eight hours. No very definite reports have yet been made concerning it, but in a number of cases in which the writer has used it it has acted very well, although drowsiness is usually present on the next day.

SOZOIODOL.

Sozoiodol is an antiseptic preparation first made and employed by one of our own countrymen in San Francisco, but at that time the preparation of it was so imperfectly carried out that foreign matters made it too irritating for general use, and it was discarded, only to be better prepared and more widely used in Germany some years later.

Therapeutics.—Sozoiodol has been found of value as an antiseptic and disinfectant in the treatment of *wounds* which are in an unhealthy state, and for *acute stomatitis* and *pharyngeal catarrh* it may be employed locally in the form of a 5 per cent. watery solution. It has also been found useful in *acute purulent conjunctivitis* and in *ophthalmia neonatorum*, in the proportion of 2 parts of sozoiodol to 30 parts of water. In *urethritis* of a specific type we may employ the preparation known as zinc-sozoiodol in a 2 per cent. solution with advantage, and this compound is also of value in mild and malignant *vaginitis* if preceded by pyroligneous acetic acid or nitrate of silver, applied by means of a speculum.

In the treatment of gynæcological cases, particularly in *catarrh of the cervix uteri*, Nitschman uses sozoiodol in the form of a powder applied by means of a tampon with good results, and it would seem to be worthy of trial in many other states of the mucous membranes than those just named.

SPIGELIA.

Spigelia, U. S., Pinkroot, is the root and rhizome of *Spigelia marilandica*, or Carolina Pink, a plant of the Southern United States.

Poisoning.—Almost immediately after the ingestion of a poisonous dose of spigelia the animal has short and quick expiratory movements, amounting almost to a cough. Soon after the pupils become widely dilated, the eyeball is turned inward, and at the same time the orbit becomes fixed in this position, so that the eye cannot follow any object, such as a pencil, when it is moved from side to side. Constant retching, with no result, now comes on, the animal standing and apparently suffering from no sensory or motor palsy. There is no change in gait. Soon after this marked exophthalmia is developed. The retching, having lasted about five minutes now passes off, and at this time signs of muscular weakness and lack of co-ordination appear, the walk becoming staggering both in the fore and hind legs. The respirations now become very rapid, resembling those of a dog after a long run on a hot day. The tongue hangs from the mouth and is dry and red, and the nose is hot and no longer moist. Muscular power is progressively lost, so that the dog frequently falls when endeavoring to walk, but sensation does not seem to be affected. About this period the animal lies down and passes into a deep sleep, which, in turn, soon changes into coma, and death follows without any movement being made, evidently from a general failure of vital force. The respirations, as death approaches, become slow, and are finally extinguished simultaneously with cardiac arrest. The palsy is spinal in origin, the motor and sensory nerve-trunks and the muscles escaping the paralysis.

Therapeutics.—Spigelia is one of the most efficient remedies in the treatment of *round-worms*, and is not dangerous when given with care. When employed for the removal of worms the usual precaution should be taken in regard to the ingestion of food (see article on Worms), and the drug should be followed by a purge to sweep out the worm while it is narcotized. The purge should be one which is rapid in its action, such as the sulphate of magnesium.

Administration.—The dose of spigelia in the form of the fluid extract (*Extractum Spigeliæ Fluidum, U. S.*) is 2 drachms (8.0);

that of the unofficial fluid extract of spigelia and senna (*Extractum Spigeliæ et Sennæ Fluidum*) is ½ to 1 drachm (2.0–4.0) for a child of two years of age; ½ an ounce (16.0) is the dose for an adult. The addition of fluid extract of senna makes the drug more efficient, and the mixture is generally not disliked by children. It is to be remembered that this latter mixture is no longer official.

SQUILL.

Scilla, U. S. and *B. P.*, is the sliced bulb of *Urginea maritima*, a plant of the countries bordering on the Mediterranean. It contains scillin, scillipicrin, and scillitoxin, all of which possess poisonous properties and none of which are used in medicine alone, except by a few persons.

Poisoning.—In poisonous doses squill produces vomiting, purging, dulness, stupor, intermittent palsy, convulsions, and death in ten to twenty hours. These symptoms are preceded by a great fall in temperature. The urine is suppressed or bloody and acute nephritis is produced. Gastro-enteritis may be marked.

Therapeutics.—Squill is largely used as a stimulant or irritant diuretic, not to affect the renal epithelium directly and promote secretion, but rather to tone up and excite to normal effort a kidney depressed by disease, as in very *chronic Bright's disease* or renal congestion from cardiac trouble. In *cardiac dropsy*, combined with digitalis, squill is a standard and much-used remedy, and is undoubtedly of value in aiding in the absorption of *effusions in the pericardium, pleura*, and *abdomen*. Squill is usually given in *dropsy*, in pill form, as follows:

℞.—Pulv. scillæ . . . . gr. x (0.65).
Pulv. digital. fol. . . . . ℈j (1.3).—M.
Ft. in pil. No. x.
S.—One t. d. after meals.

The employment of squill in *bronchitis*, although largely resorted to, is not a very good practice, since its irritant action on the kidneys and stomach may cause trouble. The period for its administration is in the beginning of the second stage, when secretion is scanty or so excessive as to need proper stimulation of the mucous membranes to bring on a healthy action. Sometimes Coxe's Hive Syrup is used, either as an emetic in drachm doses every ten minutes until it acts, or as an expectorant in the dose of 30 drops to 1 drachm (2.0–4.0) for an adult. As it contains antimony, it should be given with care.

Administration.—The fluid extract (*Extractum Scillæ Fluidum, U. S.*) is given in the dose of 1 to 5 drops (0.05–0.3); the tincture (*Tinctura Scillæ, U. S.* and *B. P.*) in the dose of 5 to 30 drops (0.3–2.0); the vinegar of squill (*Acetum Scillæ, U. S.* and *B. P.*) in the dose of 10 drops to ½ drachm (0.65–2.0). The compound syrup (*Syrupus Scillæ Compositus, U. S.*), or Coxe's Hive Syrup, is composed of squill, tartrate of antimony and potassium, precipitated phosphate of calcium, alcohol, sugar, and water, and is given in the dose of 20 drops (1.3) as a sedative to an adult and 1 drachm (4.0) as an emetic to a child.

The following prescription will be found useful in *bronchitis* in its subacute stages in a child of one to five years:

℞.—Vini ipecac.	fʒj (4.0).
Tincturæ scillæ	fʒij (8.0).
Syr. tolutan.	fʒv (20.0).
Aquæ	f℥j (32.0).—M.

S.—Teaspoonful (4.0) every three or four hours.

The plain syrup (*Syrupus Scillæ*, *U. S.* and *B. P.*) is given in the dose of ½ to 1 drachm (2.0–4.0), the honey (*Oxymel Scillæ*, *B. P.*) in the dose of ½ to 1 drachm (2.0–4.0), and the compound pill (*Pilulæ Scillæ Composita*, *B. P.*) in the dose of 5 to 10 grains (0.3–0.65).

STARCH.

Amylum, *U. S.* and *B. P.*, is wheat starch, but good corn starch is usually employed by many persons. In very fine powder starch is used as a dusting powder in *intertrigo* or *chafing*. Its more important uses are, however, its employment in the form of starch-water for carrying drugs into the rectum, and in the form of a poultice for cases of skin disease where it is desired to remove crusts.

Starch-water is made by boiling starch in the proportion of 2 tablespoonfuls to 1 pint of water, which is then boiled to paste and diluted by the addition of warm water to the consistency of syrup. Starch-water is not only useful as a vehicle for drugs given by the rectum, but as a sedative injection in proctitis and rectal irritation.

The starch poultice is made by boiling the starch to a pasty consistence or adding enough boiling water to a paste made by rubbing cold water and starch together to produce a gelatinous mass. 30 grains (2.0) of boric acid to the ounce (32.0) render it antiseptic.

STILLINGIA.

Stillingia, *U. S.*, Queen's Root, is the root of *Stillingia sylvatica*, a plant of the United States, the active principle of which is stillingin.

Physiological Action.—There can be no doubt that this drug acts in two ways: first, by its immediate effects on the system, and second, by its more slowly-shown alterative influences. In overdose it causes bilious purging, increased heart-action, and active secretion from the bronchial mucous membrane.

Therapeutics.—Stillingia is highly recommended in habitual constipation, as it increases intestinal secretion, and it is even said to act as a specific in *hemorrhoids* dependent largely for their existence upon hepatic engorgement and intestinal atony.

Bartholow recommends the following prescription under these circumstances:

℞.—Extract. stillingiæ fluid. . . . . fʒv (20.0).
Tincturæ belladonnæ }
Tincturæ nucis vomicæ } . . . . āā fʒj (4.0).—M.
Tincturæ physostigmatis }
S.—20 drops (1.3) in water t. d. before meals.

Tincture of aloes may also be added to this prescription if constipation is present. In *syphilis* of an obstinate and rapid type stillingia should be used as an aid to other drugs.

In pasty-looking, white, "putty-faced" children, who are anæmic or strumous, and who never have any appetite, or are subject to middle-ear trouble and general debility, stillingia is of value. It should be used, under these circumstances, for some time.

The only official preparation is the fluid extract (*Extractum Stillingiæ Fluidum, U. S.*), which should always be made of the fresh root, the dose of which is 10 to 60 drops (0.65–4.0).

STRAMONIUM.

Jamestown Weed, or *Datura Stramonium*, is official in the form of the leaves (*Stramonii Folia, U. S.*) and the seeds (*Stramonii Semen, U. S.* and *B. P.*). It contains an alkaloid known as daturine, which is physiologically identical with atropine.

Physiological Action.—(See Belladonna.)

Therapeutics.—The uses of stramonium are identical with those of belladonna.

Administration.—The extract (*Extractum Stramonii Seminis, U. S.* and *B. P.*) is used in the dose of $\frac{1}{6}$ to $\frac{1}{2}$ grain (0.01–0.03), the fluid extract (*Extractum Stramonii Seminis Fluidum, U. S.*) in the dose of 1 to 5 drops (0.05–0.35), and the tincture (*Tinctura Stramonii, U. S.* and *B. P.*) in the dose of 5 to 30 drops (0.3–2.0). It should be remembered that this tincture is nearly twice as strong as the tincture prepared according to the *U. S. P.* of 1880. The ointment (*Unguentum Stramonii, U. S.*) is used for the same purposes as is belladonna ointment. The dose of daturine is $\frac{1}{120}$ to $\frac{1}{80}$ of a grain (0.0005–0.0008).

STRONTIUM.

This substance has lately been introduced into medicine in the form of the bromide (*Strontii Bromidum, U. S.*), lactate (*Strontii Lactas, U. S.*), iodide (*Strontii Iodidum, U. S.*) and phosphate, largely through the studies of Laborde, Sée, Paul, and others. The bromide of strontium is used for precisely the same effects as are the other bromides, but it is claimed that, as the strontium has a distinct nutritive influence over the system, the well-known disadvantages of the potassium salt are avoided. The dose of bromide of strontium is from 30 to 60 grains (2.0–4.0). In addition to the ordinary effect of bromides, Sée found the bromide of strontium to be very useful in overcoming attacks of *gastric indigestion* associated with pain in the stomach and hyperacidity; and the author has confirmed this statement. The lactate of strontium seems to be indicated chiefly in cases of *albuminuria* due to *renal atony*. It does not increase urinary flow, and is contraindicated in the presence of the uræmia and the high fever of acute parenchymatous nephritis. In chronic parenchymatous nephritis, such as is due to rheumatism or gout, it is of value. Unfortunately, as soon as the lactate of strontium is withdrawn the albuminuria is apt to recur. The dose of the lactate of strontium is 60 to 100 grains (4.0–7.0) a day.

Strontium possesses no toxic power whatever, and overdoses are not followed by any bad consequences. If the strontium is contaminated by barium, serious effects are produced. The writer has often been much disappointed in the use of the lactate of strontium in albuminuria, but others of wide experience seem to regard it as very constant in producing good results.

STROPHANTHUS.

Strophanthus, U. S. and *B. P.*, is an African plant (*Strophanthus hispidus*), from the seed of which the natives make kombé arrow-poison. There are many varieties of Strophanthus. The active principle is strophanthin, from which is derived strophanthidin. It has been claimed that strophanthus contains a local anæsthetic principle, but Dr. de Schweinitz and the author found it to be possessed of this power only in dogs and not in man.

Therapeutics.—Strophanthus may be used in all forms of *cardiac disease* to supplant digitalis, but it is not its equal.

From the cases of cardiac disease seen frequently by the writer he has reached the conclusion that digitalis gives relief to patients under the age of twelve years in a much smaller proportion of cases than it does in adults, and that, though the stomach is no more frequently disordered, increased dyspnœa, nervous irritability, and cyanosis often follow its use. On the other hand, strophanthus generally gives good results in this class of cases.

As every one knows, there are a certain number of cases where digitalis seems to do harm in adults, the explanation being that under such circumstances the ventricle is so overstimulated that the auricle cannot empty itself thoroughly, and becomes congested in consequence. Strophanthus acts exceedingly well in those instances where digitalis fails, and this is particularly true in children. It will relieve *cardiac dropsy* by its action on the heart, but does not possess marked diuretic properties.

Untoward Effects.—Strophanthus when given in full dose frequently causes diarrhœa.

Administration.—Strophanthus is given in the form of the tincture (*Tinctura Strophanthi, U. S.* and *B. P.*) in the dose of 3 to 6 drops (0.2–0.35) three times a day. Strophanthin may be given hypodermically in the dose of $\frac{1}{100}$ to $\frac{1}{50}$ of a grain (0.0006–0.0012). Its effects when so used are said to last a week, but this statement can scarcely be correct.

SUGAR.

Saccharum, U. S. (*Saccharum Purificatum, B. P.*), is the refined juice of *Saccharum officinarum*, or Sugar-cane, or the juice obtained from the Sugar-beet. It is an antiputrefactive, but not an antifermentative. Mixed with iron preparations, it prevents oxidation. As it is a hydrocarbon, it is a nutrient and a developer of adipose tissue, or, in other words, is a food. Its use is contraindicated in obesity, during the existence of fermentative changes in the stomach and intestine, and in diabetes mellitus.

SUGAR OF MILK.

Saccharum Lactis, U. S. and *B. P.*, is derived from the whey of cow's milk by evaporation, in the proportion of about 5 per cent., and is then purified by re-crystallization. It has little sweetening power compared to cane-sugar and possesses a peculiar flat taste. It is, however, less apt to ferment and is better for infants than is cane-sugar.

Milk-sugar is largely used in triturations, because by its hardness it aids in the subdivision of the medicament. It is also used to increase the bulk of small powders where such drugs as podophyllin and calomel are prescribed.

Recent studies, both scientific and clinical, have shown lactose to be possessed of very great diuretic power when given in full doses. The advantage claimed for lactose as a diuretic is its direct action on the kidney and the slight effect exercised upon the rest of the organism. It is, therefore, in *renal dropsy* or *renal inactivity* that this substance is particularly indicated. The dose of lactose in cases of dropsy should be as great as from 2 to 4 drachms (8.0–16.0), given daily, dissolved in a quart (1 litre) of water. It has been found that the lactose acts best in those cases in which there is no albuminuria. These recent studies are of interest in view of the well-known clinical fact that the addition of lactose to the milk of bottle-fed babies always causes profuse diuresis.

SULPHATE OF ZINC.

Zinci Sulphas, U. S. and *B. P.*, is a white, somewhat efflorescent salt, of a sharp acid taste, and is soluble in water. In large amounts it acts as an irritant, and is employed as an irritant peripheral emetic in the dose of 10 to 30 grains (0.65–2.0). It is not so severe as sulphate of copper in its emetic and poisonous properties, and may be repeated if the first dose does not produce vomiting. In weak solutions it may be used as an astringent application by injection in *gonorrhœa* and other affections of the urethral mucous membrane. In 2-grain (0.1) pills it is sometimes given in *serous diarrhœas*, particularly if it be combined with opium or minute doses of podophyllin ($\frac{1}{60}$ of a grain [0.001] at a dose). In *conjunctivitis* and other eye affections the drug is used in the form of a wash. (See Conjunctivitis.)

SULPHOCARBOLATES OF SODIUM AND ZINC.

The sulphocarbolates of zinc and sodium are largely employed by some practitioners as mild antiseptic local stimulants, either in powder or in solution, on ulcers and sores. Much more commonly they are given internally for the production of gastro-intestinal antisepsis when there is *diarrhœa* with fœtid, ill-smelling stools, as in the bowel disorders of hot weather in children or adults or in the course of *typhoid fever*. How much good they do in the latter disease, so far as the disease itself is concerned, is uncertain, but they undoubtedly render the stools less foul and tend to check the diarrhœa. The sulphocarbolate of zinc is the better of the two for these purposes. The dose is 2 to 3 grains (0.1–0.15) in pill four or five times a day. The sulphocarbolates are probably eliminated from the body unchanged.

SULPHONAL.

Sulphonal, *B. P.*, is a synthetically prepared substance first manufactured in Germany by Baumann, and possesses the chemical name of diethyl-sulphon-dimethyl-methane. It is a colorless, odorless, solid substance, soluble in 100 parts of cold and 18 to 20 parts of hot water, and is readily soluble in alcohol and ether. The drug is not affected by any of the ordinary acids, and is very stable.

Physiological Action.—Several quite interesting researches upon this comparatively new hypnotic have been carried out recently. Smith of London has studied its action on the activity of tissue-change, and also attempted to determine the changes in the drug during its passage through the body. Without taking up space with a full consideration of his method of experimentation, we find that his conclusions may be summed up as follows: In moderate doses the drug is completely changed during its passage through the body into a sulphuretted organic substance, and the elimination of sulphuric acid is not increased by taking sulphonal. Dr. Smith does not give us the exact nature of the substance derived from sulphonal. Another paper upon the physiological action of sulphonal has been published by Dr. William F. Shick of Easton, Pa., who has found, by a series of experiments, first, that sulphonal when given by the stomach acts very slowly, on account of its insolubility, but that subcutaneously in warm solution it is much more active. The drug was also found to produce a general relaxation of the muscles, and a staggering gait after its hypnotic power had passed by. The spectroscope failed to show any changes in the blood. The motor nerves were not affected. Shick believes that the action of the drug is exerted upon the higher nerve-centres. He also found a decreased reflex activity, and believes this lessening to be due to stimulation of Setschenow's reflex inhibitory centre. On the circulation the drug was found to have but little power. When sent directly into the blood there was produced a slight decrease in arterial pressure, followed very soon after by an increase. Upon the respiration the drug was found to act as a depressant when given in full doses.

Therapeutics.—Sulphonal finds its place in medicine as a somnifacient or hypnotic, valuable when *functional nervous insomnia* is present, useless where advanced disease, such as cardiac trouble, is responsible for the wakefulness. In *insanity* it often produces sleep, and is of great service in the various mental disturbances characterized by lack of sleep and often affecting persons of unsound mind. Sulphonal may be defined very briefly by any one who has largely used it or watched the reports made of its progress. This definition is that the drug does possess sleep-producing power of moderate amount—not equal to chloral, but greater than that of paraldehyde—and that it will sometimes succeed where the other hypnotics fail.

Administration.—Sulphonal being virtually insoluble in cold water, it may be given in large capsules or in mucilage of acacia, so as to be held in suspension until swallowed. The insolubility and bulkiness of the drug render its use difficult. It is best given in hot water (about 6 ounces), as suggested by Stewart. This makes a solution, and as soon as the liquid is cool enough to be swallowed it should be taken before precipitation occurs as the result of cooling. Sulphonal should be used several hours—say two or three—before the patient retires. If taken late at night, the patient frequently fails to get to sleep until the morning hours, and is heavy and drowsy all the next day. This difficulty is partly avoided by the use of a hot solution, but even then is apt to arise. The dose is 20 to 40 grains (1.3–2.6). It is wise not to use sulphonal continuously for more than a few days.

Untoward Effects.—When sulphonal is taken in full dose for long periods of time, great sleepiness and weariness, with an unsteady gait, develop, which may go on to paralysis of the lower extremities if the use of the drug is persisted in. In some cases the paralysis is progressive, and in others hyperæsthesia and abnormal sensations develop. In all such cases there is great disturbance of digestion with scanty secretion of urine, which contains an unusual substance, giving this secretion the color of port wine (hæmatoporphyrinuria). Sulphonal often produces heaviness and a staggering gait the day after it is taken. There are numbers of cases of death on record from acute and chronic poisoning by sulphonal. In both classes of cases the death was by respiratory failure preceded by deep unconsciousness.

SULPHUR.

Sulphur is a non-metallic element official in three forms in the *U. S. P.*—namely, as *Sulphur Sublimatum*, *U. S.* and *B. P.*, or sublimed or flowers of sulphur; *Sulphur Præcipitatum*, *U. S.* and *B. P.*, or precipitated sulphur; and *Sulphur Lotum*, *U. S.* and *B. P.*, or washed sulphur.

Much confusion exists among students as to the differences between these various forms of sulphur. Sulphur itself is an element which is prepared for medicinal uses by being heated and sublimed (*Sulphur Sublimatum*), or flowers of sulphur. Sulphur lotum, or washed sulphur, is prepared in order to get rid of sulphuric acid and other contaminating substances, and is made from sublimed sulphur. Sulphur præcipitatum is also made from sublimed sulphur, and is more bland and minutely subdivided. Some believe it differs from sublimed sulphur in its therapeutic properties by reason of a small amount of water supposed to be present. It is sometimes called milk of sulphur. When sulphur is prescribed for internal use the sublimed sulphur is generally designated.

Physiological Action.—Sulphur has little physiological influence over the general system. When taken internally it causes a soft, mushy stool of a yellow color with a strong odor of hydrogen sulphide. The drug acts particularly on the skin and mucous membranes. The juices of the intestines break up some of it into sulphuretted hydrogen and sulphides.

Therapeutics.—Sulphur is used as a mild laxative, never as a purge. In *stricture of the bowels* the soft stools produced by it will often slip by the obstruction, and it is worthy of note that sulphur will sometimes overcome constipation when nothing else will give relief. It is particularly valuable in the treatment of *constipation* where there are *hemorrhoids*, and in *chronic rheumatism* and *sciatica* it is thought by some to effect a cure.

Sulphur is of great service in the treatment of *chronic bronchial affections*, but for some curious reason its use has become almost obsolete. The so-called Bergeon's method of treating *phthisis* by rectal injections of carbonic acid gas loaded with sulphuretted hydrogen was simply a revival of a custom of our great-grandfathers, who often used sulphur-waters by the mouth in the treatment of catarrhs or other disorders of mucous membranes. Bergeon took the trouble to go to the rectum to accomplish what was done two hundred years ago by the mouth, and the only novel part of his method was his filthy way of using the remedy. Graves recommended 5 to 10 grains (0.35–0.65) of sulphur three times a day wherever bronchial secretion was excessive, and found that it rid the lungs of mucus and relieved the *cough*.

The external use of sulphur is very much more important than its internal use, in so far as regards affections of the skin. Of itself, the drug exercises little effect over the cuticle when used in powdered form, but combination with an ointment makes it at once active. Even irritations of the skin may ensue from its constant use in concentrated form.

In *scabies*, or *itch*, sulphur ointment (*Unguentum Sulphuris, U. S.* and *B. P.*) is the best remedy we have. The female parasite burrows under the epiderm and deposits the ova as she moves about, while the male does not burrow, but stays on the surface. The ointment will kill him, as he is readily attacked, but the female is protected by her burrowing propensities. To get at her and the ova the burrows must be opened, and this may be accomplished by a thorough soaking of the body with soap and water, thereby softening the epiderm covering the parasite, which can then readily be removed by rubbing the patient with a rough towel. The towel should be boiled at once to prevent its conveying the parasite to others. The ointment, if now applied, relieves the patient almost at once. It is important that the skin be well softened and rubbed, in order to keep open every burrow. The ointment should be allowed to remain on the part all night and be used for three or four nights consecutively.

Young women often suffer from *acne*, particularly about the menstrual epoch, the skin also becoming at this time sallow and muddy. Ringer recommends the following lotion as one which is very successful in promoting a cure:

℞.—Sulphuris sublimati . . . . ʒj (4.0).
Glycerini . . . . fʒj (4.0).
Aquæ rosæ . . . . f℥viij (256.0).—M.
S.—Apply as a wash once or twice daily.

Administration.—Sulphur is given in the dose of 10 to 20 grains (0.65–1.3) three times a day as an alterative, and from 1 to 2 drachms (4.0–8.0) at night as a laxative, with a little molasses to form a paste.

A confection (*Confectio Sulphuris*) is official in the *B. P.*, dose 10 grains to 2 drachms (0.65–8.0).

Sulphide of Calcium.

(See Calcium, Calx, and Sulphides.)

SULPHURIC ACID.

Acidum Sulphuricum, *U. S.* and *B. P.*, Sulphuric Acid, or Oil of Vitriol, is a powerful irritant and escharotic, rapidly dehydrating and carbonizing the tissues, causing them to become black. It is the most astringent of the medicinal mineral acids, and when absorbed it unites with bases to form sulphates, and is so eliminated by the kidneys, the lower bowel, and the skin. It coagulates albumin.

Poisoning.—The symptoms produced by poisonous doses are those of a gastro-intestinal inflammation of the most severe type, or the patient may drop to the floor almost at once, owing to collapse dependent upon perforation of the walls of the œsophagus or stomach by the acid and its consequent escape into the peritoneal cavity. If the patient lives to the fourth day, the parotid glands may become swollen as the result of stenosis of the salivary ducts of Steno, and violent inflammation of the kidneys may appear from the passage of the drug through these organs in the process of elimination. If partial recovery takes place, the patient often dies from inanition due to the formation of strictures in the alimentary canal or to destruction of the peptic tubules. The stain about the mouth is black, and if any of the acid is spilt on the clothes the characteristic burn is to be seen.

The treatment consists in the use of alkalies, such as chalk, magnesium, whitewash off the walls, and soap. Opium and oils are to be given to allay irritation, and external heat is to be applied.

Therapeutics.—Sulphuric acid is sometimes employed as a caustic to *venereal sores*, *warts*, and *slowly-healing ulcers*, but is most commonly used internally, as it fulfils several pressing indications. As a remedy for *serous diarrhœa*, particularly if combined with some vegetable astringent, it is unsurpassed, and its use in *cholera* deserves great attention. (See Diarrhœa.) In the Philadelphia Hospital during an epidemic of cholera some years since every case which received sulphuric acid improved or failed to be attacked, whereas those who did not receive it were either very ill or died.

The proper way to use the drug as a prophylactic during *cholera* epidemics is in the form of "sulphuric-acid lemonade," made so that each wineglassful of water contains 5 drops (0.35) of the aromatic sulphuric acid. The same solution may be used in *acute lead poisoning* in order to form an insoluble sulphate of lead, and may be taken by artisans exposed to chronic lead poisoning as a prophylactic for the same purpose.

As sulphuric acid is eliminated by the skin, it is often useful in the *night-sweats of phthisis* combined with belladonna or morphine.

Administration.—The dose of the dilute acid (*Acidum Sulphuricum Dilutum*, *U. S.* and *B. P.*) is 10 to 20 drops (0.65–1.3), and of the aromatic acid (*Acidum Sulphuricum Aromaticum*, *U. S.* and *B. P.*) 5 to 20 drops (0.35–1.3). The latter is the best preparation for general use. It contains ginger and oil of cinnamon. Both should be thoroughly diluted before they are administered.

SUMBUL.

Sumbul, *U. S.*, is the root of *Ferula Sumbul*, a large plant of Northern Asia. The dose of the root (*Sumbul Radix*, *B. P.*) is 10 to 40 grains (0.65–2.65). On the nervous system sumbul acts as an efficient nerve tonic, and was very largely employed by Goodell in cases of *nervous exhaustion* and in the unrest of nervous females. It is official in the tincture (*Tinctura Sumbul*, *U. S.* and *B. P.*), dose 1 to 4 drachms (4.0–16.0). Goodell uses the following formula:

℞.—Extract. sumbul.	gr. xx (1.3).
Ferri sulph. exsiccat.	gr. xx (1.3).
Asafœtidæ	gr. x (0.65).
Acid. arsenosi	gr. ½ (0.03).—M.

Ft. in pil. No. xx.
S.—One t. d. after meals.

To be of any value the drug must be fresh, and care must be taken that the crude drug from which it is made is a good sample.

SUPRARENAL GLAND.

The use of thyroid and other glands for medicinal purposes has led to the employment of the adrenal gland, or its extract, in the treatment of disease in which this gland is found so disorganized as to be unable to carry out its function of internal secretion—as, for example, *Addison's disease*. It has been found by Oliver, Schafer, Abel, and others, that an extract from these glands possesses a very distinct physiological action, which consists chiefly in a great rise of arterial pressure, apparently produced by stimulation of the muscular coats of the blood-vessels; but while it causes such positive effects in ordinary doses, overdoses do not seem to possess markedly toxic influences in man or animals.

Because of this effect, and also because suprarenal extract increases muscular tone generally, the extract may be employed in cases of *relaxation of the vasomotor system*, in *neurasthenia*, in *cardiac feebleness*, and perhaps in cases of *purpura*. It has been used with asserted great success in the treatment of *diabetes insipidus*. Suprarenal extract is also said by some to be of value in cases of *anæmia* of the pernicious type with enlargement of the liver and spleen.

Usually when suprarenal gland is used the effect is produced very slowly. It is best given by the stomach, and neither the acid nor the pepsin have any effect upon it. Careful investigation shows beyond a doubt that the powdered gland, dried *in vacuo*, and given in tablet in the dose of 3 to 5 grains (0.18–0.30), three times a day, is the most efficacious preparation.

SWEET SPIRIT OF NITRE.

Sweet Spirit of Nitre (*Spiritus Ætheris Nitrosi*, *U. S.* and *B. P.*), or Spirit of Nitrous Ether, is a mixture of alcohol, water, and ethyl nitrite. It is upon this last constituent that most of its value as a remedial agent depends. The drug when sold by pharmacists or others who are not very careful to keep fresh preparations is no better than alcohol and water alone, since the ethyl nitrite readily escapes, and deterioration at once takes place. Until recently the profession have had no ready means of protecting themselves from such poor preparations, but at present we know that all that is necessary to discover this absence is to add a grain or two of antipyrin to a ½ ounce or less of the spirit. If the ethyl nitrite be present, a purple color followed by a green precipitate will be formed. This green precipitate is iso-nitroso-antipyrin, which is not in the least poisonous.

Physiological Action.—Sweet spirit of nitre is a sedative to the circulatory and nervous system and a diaphoretic and diuretic, according to the manner in which it is administered.

If given in very full doses, it rapidly produces the cyanosis characteristic of the full effects of any one of the nitrites. (See Amyl Nitrite.)

Therapeutics.—There is probably no drug so widely employed by the laity as a household remedy which is so potent for good, and yet so harmless, if wrongly used, as is this one.

Physicians often place less reliance upon it than it deserves, and in nearly every instance where it fails it is either not indicated or the nitrite has escaped and left it powerless.

In *incontinence of urine* in children the combination which follows is very useful in certain cases. (See Incontinence of Urine.) In these instances the urine will be found high-colored and concentrated, and therefore capable of irritating the bladder and genito-urinary tract:

℞.—Potassii citratis . . . . ʒj to ʒij (4.0-8.0).
Spt. ætheris nitrosi . . . . f℥ss (16.0).
Aquæ . . . . q. s. ad f℥iv (128.0).—M.
S.—Dessertspoonful (8.0) every five hours until the urine becomes clear.

As soon as the urine is clear, belladonna may be used, the citrate of potassium and spirit of nitre being continued or not as the case demands. Where the spinal centres are depressed and there is general atony of the system, it may be well to substitute the following pill for the belladonna:

℞.—Acid. arsenosi . . . . gr. ¼ (0.016).
Extract. nucis vomicæ . . . . gr. ij (0.1).
Quininæ sulphatis . . . . gr. xx (1.3).—M.
Ft. in pil. No. xx.
S.—One pill t. d. after meals.

The diuretic action of sweet spirit of nitre is best obtained by using the drug in ice-cold water and keeping the patient lightly covered and cool. On the other hand, if a diaphoretic influence is desired, it may be given simultaneously with warm lemonade, and the patient should be well blanketed. This last action of sweet spirit of nitre has made it a remedy of common use in treating acute colds in adults and children, and in setting aside the fever of these conditions in the latter class as well.

Sweet spirit of nitre is a distinct antispasmodic, and can be well employed where slight *nervous excitement* accompanies fevers or in other states associated with irritation in infancy.

The dose for an adult is from 20 drops to 1 drachm (1.3–4.0), and for a child of one year 5 to 10 drops (0.35–0.65). It should always be given in cool water to the latter class of patients.

TAMARINDS.

Tamarindus, *U. S.* and *B. P.*, is the preserved pulp of *Tamarindus indica*, a tree of the West Indies.

The taste is a peculiar mixture of bitter and sweet. As a laxative it exerts little power over that of any ordinary fruits, such as apples, but it enters into the confection of senna (*Confectio Sennæ*, *U. S.* and *B. P.*). Patients often find tamarinds a very agreeable laxative when they are taken before going to bed or eaten as a confection after meals.

TANNIC ACID.

This acid when pure is an uncrystallizable, white or yellowish-white powder without bitter taste and very soluble in water or glycerin. It is not so soluble in alcohol and ether. It is the chief active principle of vegetable astringents, and occupies the relative position of an alkaloid to a crude drug, so far as the active portion of these vegetable astringents is concerned. Tannic acid is derived from nutgall.

Physiological Action.—Tannic acid when brought in contact with any of the tissues of the body constringes them and decreases their vascularity for a time, by causing contraction of their blood-vessels. For these reasons it stops secretion and condenses parts of the body which are relaxed and feeble. Mixed with blood, it forms a clot with great rapidity through coagulation of the albumin. Tannic acid is absorbed as gallic acid and eliminated as such, only acting as tannic acid before absorption. This is important to remember, since we learn from this that tannic acid is to be used to check hemorrhage only where the drug can be brought in direct contact with the bleeding point. If a hemorrhage is to be reached through the circulation, as in renal bleeding, gallic acid is to be given, as it is absorbed at once without change.

Therapeutics.—Tannic acid is used in medicine to control *hemorrhage*, and to act as an astringent to relaxed tissues, as in *diarrhœa* of the atonic or serous type, or in localized or general *sweating*. It is also of service for the purposes of toughening mucous membranes or parts of the skin which are exposed to much rubbing, as in the case of the nipples of a primipara, or where the feet become macerated and sore or sweat profusely on exercise being taken. In the treatment of *hæmoptysis* tannic acid may be dissolved in water in the proportion of 5 to 10 grains (0.35–0.65) to the ounce (32.0) and used in a fine spray delivered from an atomizer. Glycerite of tannin is made by adding 2 ounces (64.0) of tannic acid to a ½ pint (250 cc.) of glycerin, and mixing at a gentle heat until solution occurs. It is useful as an application to *slow ulcers* and *depressed mucous membranes*, as after an attack of stomatitis. In hemorrhoids of the bleeding type tannic acid suppositories are often very useful, and cotton saturated with tannic-acid solution is often used as a packing in *vaginal leucorrhœa*.

Administration.—The dose of tannic acid is 2 to 10 grains (0.1–0.65), best given in pill. The official preparations are—the troches (*Trochisci Acidi Tannici*, *U. S.*), each containing 1 grain of tannin; the *Glyceritum Acidi Tannici*, *U. S.*; *Collodium Stypticum*, *U. S.*; and an ointment (*Unguentum Acidi Tannici*, *U. S.*). The *B. P.* preparations are—*Glyceritum Acidi Tannici*; *Suppositoria Acidi Tannici*, each containing 3 grains (0.15); and *Trochisci Acidi Tannici*, of which each contains ½ grain (0.03) of the acid.

TANSY.

Tansy (*Tanacetum*, *U. S.*). The leaves and tops of *Tanacetum vulgare* yield a volatile oil (*Oleum Tanaceti*) which possesses emmenagogue powers and has been largely used as a uterine stimulant. It is also used as an anthelmintic.

In poisonous dose it causes epileptiform convulsions in some cases, and deep coma, with death from respiratory failure.

The dose of the oil as an emmenagogue is 1 to 3 drops (0.05–0.15).

In domestic medicine tansy tea, made by adding 1 ounce (32.0) of the leaves or tops to 1 pint (½ litre) of water, and given in the dose of 1 to 2 ounces (32.0–64.0), is largely employed as a remedy for *amenorrhœa.*

TAR.

(See p. 324.)

TARAXACUM.

Taraxacum, U. S., Dandelion, is a very old remedy for hepatic torpor and the dyspepsia resulting therefrom. It should be prepared from the fresh leaves or roots, as the dried, stale plant is inert. From disregard of this fact much disappointment has arisen. Owing to its being bitter it acts as a tonic. The extract (*Extractum Taraxaci, U. S.* and *B. P.*), dose 5 to 30 grains (0.35–2.0), and the fluid extract (*Extractum Taraxaci Fluidum, U. S.*), dose 1 to 3 drachms (4.0–12.0), are the only official preparations. *Succus Taraxaci, B. P.*, is given in the dose of 1 to 2 drachms (4.0–8.0); *Decoctum Taraxaci, B. P.*, is administered in the dose of 2 to 4 ounces (64.0–128.0).

TARTARIC ACID.

Acidum Tartaricum, U. S. and *B. P.*, is derived from crude potassium bitartrate, and is much less powerful than acetic acid, but capable of producing very severe gastro-enteritis if taken in overdose and in concentrated form. It is rarely used alone, and is most commonly employed to act upon sodium or potassium bicarbonate to form effervescent drinks. (See Seidlitz Powder and Effervescing Draughts.) The dose is 5 to 20 grains (0.35–1.3).

When tartaric acid is taken in poisonous dose, lime-water, alkalies, and magnesium are the antidotes, and opium is to be given to allay irritation. If necessary, emetics are to be used.

TEREBENE.

Terebenum, U. S., is a liquid substance, clear, colorless, insoluble in water, having a peculiar odor like that of new pine sawdust, and is made by the action of sulphuric acid upon oil of turpentine, which is then distilled at about 160° F.

Therapeutics.—Terebene is a very useful stimulating expectorant, to be used in the late stages of *acute* or in *chronic bronchitis* to liquefy and get rid of the mucus which is clogging the bronchial tubes. The drug may be given by way of the stomach or by inhalation. A useful mixture in the later stages of *bronchitis* when the mucus is very thick and tenacious is one composed of equal parts of terebene, iodide of ethyl, and chloroform, placed on a sponge and held some two or three inches from the face. It has also been employed in *genito-urinary inflammations* of a subacute or chronic form in place of oil of sandalwood or copaiba as a stimulant. In *fermentative dyspepsia* it is of service as an antiseptic. The drug should always be given in capsules in the dose of 5 to 10 minims (0.35–0.65), or by dropping it on sugar in the same amount. This dose may be repeated every three hours. Unfortunately, terebene is very apt to irritate the stomach or to produce diarrhœa, and it sometimes irritates the kidneys.

TERPINE HYDRATE.

Terpine Hydrate (*Terpini Hydras, U. S.*) is prepared by a certain process, unnecessary to explain, from a mixture of pure oil of turpentine, alcohol, and nitric acid. In this manner large, colorless crystals, without odor and with a faint taste, are formed, and in this form the drug appears on the market. Terpine hydrate is soluble in 250 parts of cold, 32 parts of boiling water, and in 10 parts of alcohol. In ether it requires 100 parts for its solution, and in chloroform 200 parts.

Therapeutics.—Terpine hydrate is used for the purpose of increasing secretion from the bronchial mucous membrane, and is a useful remedy in subacute or *chronic bronchitis* to rid the tubes of mucus. The drug has also been satisfactorily employed in the treatment of *hay fever* when given in full doses. The remedy, while only useful in a limited number of conditions, certainly seems to be very useful in the variety of diseases named. The dose as generally given is 2 to 3 grains (0.1–0.15), but it may given in the dose of 15 to 20 grains (1.0–1.3) three times a day in hay fever. Terpine hydrate may be prescribed in pills, capsules, and in alcoholic solution flavored with some of the aromatic waters and with the addition of a little syrup. Thus:

℞.—Terpin. hydrat. . . . . gr. lxxv (5.0).
Spt. vini gallici . . . . f℥ij (60.0).
Syrup. lactucarii,
Syrup. tolutan. . . . . āā f℥iij (90.0).—M.
S.—1 to 2 dessertspoonfuls (0.8–15.0) three or four times a day.

Or we may prescribe—

℞.—Terpin. hydrat. . . . . gr. xl (2.65).
Acid. benzoic. . . . . gr. xl (2.65).
Codeinæ . . . . gr. v (0.3).—M.
Ft. in pil. No. xx.
S.—1 pill three or four times a day.

TERRINOL.

Terpinol is derived from terpine hydrate by boiling the latter with dilute mineral acids. Terpinol occurs as an oily substance smelling like hyacinths. It is almost insoluble in water, but dissolves readily in ether and alcohol. It is used for precisely the same purposes as terpine hydrate, in the dose of 8 to 20 grains (0.5–1.3), in capsules or pills. This dose may be given twice or thrice a day. The drug may irritate the stomach and kidneys when given in overdose.

THAPSIA.

Thapsia garganica is an umbelliferous plant of South-eastern Europe, employed for the purpose of producing a blister. It is generally used under these circumstances in the form of a plaster. The resin, obtained from the bark of the root, is the form in which it appears in medicine. When applied continuously it produces great irritation, and finally sloughs appear.

THIOL.

Thiol is a substance introduced into medicine as a substitute for ichthyol, as the latter drug possesses the disadvantage of having a disagreeable odor. It is derived from brown-colored paraffin or gas oils by a complicated process. The product obtained is evaporated *in vacuo* to a thin extract called *Thiolum Liquidum*, or still further to dryness, or *Thiolum Siccum*. The liquid thiol occurs as a thin brownish-black neutral fluid, smelling somewhat like birch oil. It is slightly soluble in alcohol and ether, but quite soluble in water, forming a clear mixture, which is rendered more perfect by the addition of glycerin. Thiol sicca may appear in lustrous scales.

Therapeutics.—The question which arises at once in regard to thiol is, whether the fact that thiol is practically an artificial ichthyol necessarily indicates that it can be used as a substitute for that substance? While it is true that they are both sulphur compounds, it is also true that ichthyol possesses very extraordinary powers not met with in any other form of sulphur compound previously known. Thiol has been used largely by skilful observers in diseases of the skin in *moist eczema*, *scrofulosis of the skin*, and in *syphilides* with asserted good results. In cases of *moist eczema* the thiol is used, after first washing the part with an antiseptic solution, if it is dusted over the skin in the form of powder. Bidder has treated the disease by using compresses wet with thiol in 10 per cent. solution.

While it is claimed that thiol will relieve exudations about joints and elsewhere in as effective a manner as ichthyol, sufficient evidence as to this point is not yet before us. Thiol is much cheaper than ichthyol.

THIOSINAMINE.

Thiosinamine is a preparation derived from volatile oil of horseradish, or more commonly from the volatile oil of mustard seed, by the addition of alcohol and ammonia water and exposing it to heat. Under these conditions crystals of thiosinamine are deposited in prisms which are soluble in 2 parts of warm water, and in alcohol or ether. A solution of it should not redden litmus paper.

This substance is used in medicine for the cure of *lupus* in *scars*, and *keloid*, and it has been used with asserted success in *malignant growths*. In a case of keloid the drug in 10 per cent. solution in absolute alcohol may be injected directly into the part affected in the dose of 10 to 20 minims (0.65–1.3) every third or fourth day. The part receiving the injection usually becomes congested and swollen and dark in hue. There is often a great increase in the urine, and perhaps nausea and vomiting, and great pain where the injection is given. In cases of lupus it may be injected locally or at a distant spot, and produces a reaction like that caused by tuberculin. The drug may also be given internally in the dose of 4 to 6 grains (0.2–0.4) once a day.

THYMOL.

Thymol, U. S. and *B. P.*, is derived from the oil of thyme and other volatile oils, and occurs in large crystals. It is almost insoluble in water, but is freely soluble in fats and oils. Thymol is irritant, but antiseptic and disinfectant, and has been employed in typhoid fever as an *intestinal antiseptic* by Henry and others. Under these conditions it should be used in gelatin-coated pill, and a glass of water or milk taken to avoid the burning sensation. In the treatment of *stomatitis* or *tenderness of the gums* after mercurialization the following mouth-wash may be used:

℞.—Thymol	gr. x (0.65).
Sodii boratis	gr. xv (1.0).
Aquæ	f℥ij (64.0).—M.

S.—Place a teaspoonful (4.0) of this in ½ a tumblerful of water and use as a gargle.

Thymol has been used for dressing wounds, but is too costly. In summer weather it cannot be employed, because of its power of attracting flies, which make the patient's life miserable. The dose is ½ to 2 grains (0.03–0.1), in capsule or in wafer, and it is better to follow its use by a glass of milk to prevent the drug from irritating the stomach. In *typhoid fever* as much as 30 grains (2.0) in twenty-four hours may be given as an intestinal antiseptic.

If very large amounts (100 grains [7.0]) are taken in a day, poisoning may result, but as much as this must be used before danger is present.

Thymol Iodide.

This compound of iodine and thymol, sometimes called *aristol*, but more correctly dithymol diiodide, has been introduced into medicine for the purpose of substituting iodoform. It does not possess the unpleasant odor of iodoform, and it is stated to be less apt to produce poisoning by absorption. A great deal of contradictory experience has accumulated as to its exact value, but the result of a careful examination of clinical reports is that in some respects it is a better drug than iodoform and in others not so good. Tichhoff and Neisser state that when taken internally thymol iodide is incapable of causing toxæmia, but this can only be true when moderately large doses are given. Upon cocci and bacilli thymol iodide has less power than iodoform. In regard to the power of this drug in healing wounds or sores, the decision has been reached that whenever secretion is free it is contraindicated, as the thymol seems to increase moisture. On the other hand, in those instances where in disease of the skin or mucous membrane an undue dryness is present the effect produced is often favorable. Upon *lupus* little effect is produced unless the surface is first curetted. Finely-powdered thymol iodide has been found of very unusual value in the treatment of *interstitial keratitis* by de Schweinitz and Wallace when dusted into the eye each day. In an ointment of $\frac{1}{2}$ to 1 drachm to the ounce of lard (2.0–4.0 : 32.0) thymol iodide may be used in *psoriasis*, but it is not as useful as is chrysarobin in this affection.

THYMUS GLAND.

The Thymus Gland has been used quite largely in certain diseases on the same principle as that governing the use of the thyroid, namely, that this gland possesses the function of internal secretion and will therefore benefit certain systemic conditions in persons in whom the thymus was atrophied too early in life. Others have used it as a substitute for the thyroid, intentionally or by mistake.

Its chief use has been in the treatment of *goitre* (not exophthalmic). It does not produce any disagreeable effects as does the thyroid. Usually the beginning dose is half an ounce (15.0) administered several times a week. This dose is soon increased to an ounce (30.0) once a week. In this country Parke, Davis & Co. prepare thymus gland in tablets and capsules ready for use, and this is the best form in which to prescribe it.

THYROID GLAND.

The Thyroid Gland has been introduced into therapeutics within the last few years for the purpose of relieving certain disturbances of nutrition of which the most characteristic are myxœdema and cretinism. The results obtained from its use in these states are extraordinary, and it is to be regarded as a specific. Its use is based upon the fact that in cases of myxœdema the thyroid gland is usually found atrophied, and on the discovery by Reverdin, Kocher, Schiff, Fuhr, Horsley, Credé, Zesas and others, that extirpation of this gland produces myxœdema or a train of symptoms practically identical with it. Soon after these studies had been verified it was suggested that myxœdema might be cured if it were possible to transplant part or all of the thyroid gland of one of the lower animals to the body of the patient [illegible] with the hope that this healthy glandular tissue would become vascularized and exercise its beneficent influence on the disease process. This method has been attempted again and again, nearly always with [illegible] which, however, have been only temporary because the transplanted gland has not become well vascularized and has been [illegible]. When this operation is attempted the gland of the sheep is chosen because it most closely resembles that of man and its removal from the sheep causes in that animal symptoms very like those seen in a person suffering from disease or absence of the thyroid gland. The [illegible] of the gland is [illegible]

[illegible]

fresh gland, the ordinary sheep's thyroid weighing about 24 grains. When the remedy is first employed we usually employ about 1 grain of P. D. & Co.'s powdered gland, which is gradually increased a grain a day until about 6 grains a day are reached, when a halt is made and the effect of this dose watched for some days. If the patient does not manifest symptoms of overdose on the one hand or fail to improve on the other, then the dose may be further gradually increased. No more than 15 grains of the dried gland should be given each day, and this quantity should be divided into several doses.

Thyroid gland has been used very largely in the treatment of *cretinism* with success only second to that attained in the therapy of *myxœdema*, and with asserted success in *excessive obesity* and *psoriasis*. In the author's experience its effects are inconstant in obesity. It benefits some patients and is useless in others. It has also been asserted that thyroid therapy is useful in the treatment of *exophthalmic goitre*, but this is quite positively contradicted. Indeed it is claimed by some that this disease is made worse by its use. Probably it will be found that true exophthalmic goitre is not benefited, but it may be proved that when simple hypertrophy of the connective tissue of the thyroid produces the enlargement it is useful.

Thyreoiodine and Iodothyrine have been introduced as representing the therapeutic activity of the crude gland, but while they possess some action they cannot be so used with the expectation of such good results as when the desiccated thyroid itself is resorted to.

Untoward Effects.—Overdoses of thyroid produce violent headache, feeble action of the heart, and sometimes diarrhœa and vomiting. Should any of these symptoms come on they are an indication for the complete stoppage of the use of the drug for some days, and a return to its use must be gradual. These symptoms can be avoided by cautious dosing and by keeping the patient in bed for some days after the treatment is inaugurated. A vegetable diet will also aid the treatment.

After marked improvement or apparent cure has been effected by the treatment, it is necessary for the patient to continue using thyroid extract indefinitely, for if it is stopped the myxœdema returns. The remedy may be given in minute daily doses or in full doses for several days at the end of every three weeks or a month. Though the latter plan is the more disagreeable it is asserted to possess a greater therapeutic and preventive value.

TRICHLORACETIC ACID.

Trichloracetic Acid is a compound of chlorine and acetic acid occurring in deliquescent crystals and used as a rapid, active escharotic upon venereal and other warts. A peculiarity in its effect is that it produces a dry scab which speedily falls off, leaving a healing surface beneath. It is also claimed that its action is not followed by secondary inflammation and pain. It is used by applying a crystal to the wart or other growth.

TRIKRESOL.

Trikresol consists in a combination of ortho-, meta-, and paracresol, bodies allied to creolin and carbolic acid. Trikresol appears in commerce as a white liquid, smelling somewhat like creosote, and soluble in water in the proportion of about 2½ per cent. It forms a clear solution, and does not benumb the skin as does carbolic acid. It is also much less irritant and less poisonous than carbolic acid or bichloride of mercury.

Therapeutics.—Trikresol is used as an antiseptic in surgery in 1 per cent. solutions. In the strength of 1 : 500 to 1 : 1000 it may be employed as an antiseptic collyrium in ophthalmic practice, in which field it has proved very useful.

TRIONAL AND TETRONAL.

These two substances are very closely related to sulphonal, and are practically identical with that drug in their effects on the general system. They occur in shining, odorless, colorless plates with a very faint taste. Trional and tetronal are used for the relief of *insomnia* of a functional type, and the sleep produced by these ordinarily comes on in about twenty to thirty minutes after the drug is taken, and lasts five to six hours. The dose is 15 to 30 grains (1.0–2.0). Doses larger than 15 to 30 grains should never be given continuously, and it is always a good plan after the drug has been given for five or six consecutive days to stop its use for two or three days. It is well to order for the patient who is taking trional, if there is any tendency to constipation, one of the saline purgatives daily.

Trional and tetronal are slightly soluble in water and very soluble in alcohol. Advantages in their use are lack of disagreeable taste and the absence of symptoms of circulatory depression. The best way to administer trional or tetronal is in hot broth or tea or whiskey. It is wise to gradually decrease the dose if the drug is taken night after night. Tetronal is more expensive than trional, but sometimes succeeds when trional fails. Both of these drugs are apt to make the patient very drowsy the day after their ingestion.

When trional is taken in full dose for several weeks, it produces very distinct alterations in the blood, which are manifested by hæmatoporphyrinuria—a state in which the urine is dark red or almost black. The drug should be stopped at once when the urine begins to be red and saline purgatives must be used freely.

TURPENTINE.

Terebinthina, U. S., occurs in two forms—namely, as turpentine derived from the ordinary yellow pine (*Pinus palustris*) and other varieties of pine, and as Canada turpentine (*Terebinthina Canadensis, U. S.*) derived from *Abies balsamea*, or silver fir, or species of cone-bearing trees other than *Pinus palustris*. The turpentine derived from the latter sources is sometimes called "Balm of Gilead."

Much confusion often exists in students' minds as to the difference between oil of turpentine (*Oleum Terebinthinæ, U. S.* and *B. P.*) and spirit of turpentine, both of which are the same substance under a different name. This oil is not, however, the same thing as "turpentine," for the oil is distilled from turpentine. The distilled oil is a thin, clear fluid having a peculiar odor and taste, and is irritant to the skin and mucous membranes. It is exceedingly inflammable, should never be placed near a light, and if added to any strong mineral acid takes fire.

When turpentine is spoken of in this book or in medicine generally, the doubly distilled oil of turpentine (*Oleum Terebinthinæ Rectificatum, U. S.*) is what is meant unless the contrary is stated.

Physiological Action.—Turpentine when taken internally produces a sense of warmth in the stomach, a quickened pulse, a warm skin, and slightly accelerated breathing. In overdose it may cause intoxication. Upon the circulation it produces a very slight rise of arterial pressure, increased pulse-rate, and increased heart-force. On the nervous system the drug, in large amounts, causes loss of sensation before it affects voluntary motion.

The drug is eliminated by the kidneys and lungs, and gives the odor of violets to the urine.

Poisonous doses cause strangury, bloody urine, renal inflammation, and cyanosis, with dilated pupils and gastro-enteritis.

In persons with an idiosyncrasy to this drug, erythematous, papular or vesicular eruptions may follow its external or internal use.

Therapeutics.—EXTERNAL USE.—Turpentine is used as a local application for the purpose of producing counter-irritation over any area where deep-seated *inflammation* exists. Under these circumstances it is almost always used in the form of a stupe, made as follows: Place a tin cup containing the turpentine in a vessel containing hot water, so that the turpentine may be warmed without coming near a flame. Dip a piece of flannel into very hot water and wring it out in a twisted towel, and when it is so dry that no water drips from it, dip it into the hot turpentine and wring it out again to free it from any excess of the drug. The cloth, while hot, should be applied, and allowed to remain until discomfort ensues, when it should be withdrawn, as it will blister the skin if left on too long. Children and adults suffering from bronchitis may be rubbed on the chest with turpentine with much relief, but in the former class of patients it should be diluted with sweet oil, half and half, or even two-thirds of oil.

INTERNAL USE.—Turpentine is used internally as a stimulant of a diffusible type in the course of the *exhausting fevers*, particularly if any *flatulence* exists or if any *ulceration of the bowels* is present. In *typhoid fever* turpentine stupes, turpentine enemata, and the administration of the drug by the mouth are the best ways to overcome tympanites. At the end of the second week, when the tongue is red, dry, cracked, and brown, the teeth covered with sordes, and tympany is well marked, turpentine may be used in emulsion in the dose of 5 to 10 drops (0.3–0.65) three times a day. Again, in convalescence from typhoid fever, when diarrhœa is persistent and relapses are constant and due to an unhealed state of Peyer's patches, turpentine is the remedy *par excellence.*

In *intestinal* and other *passive hemorrhages* such as *menorrhagia* or *hæmaturia*, the drug is often of service.

Used against the *tape-worm*, turpentine is given in the dose of ½ an ounce to 1 ounce (16.0–32.0), mixed with an equal amount of castor oil. This treatment is a somewhat dangerous practice, but is efficient. In chronic and well-advanced kidney disease very large doses of powerful diuretics are often required to stimulate the kidneys sufficiently to cause urinary flow, and turpentine may be used under these circumstances.

Turpentine is contraindicated in the presence of any *acute inflammation of the gastro-intestinal tract* and in *acute nephritis.*

In *lumbago* the dose of 20 drops (1.3) is said to be very useful, and many have found the vapor of turpentine of value in *bronchitis* of a subacute or chronic type when inhaled from boiling water. In *gleet* it is given by the mouth to stimulate the genito-urinary tract. Turpentine should be tried in the treatment of *purpura hæmorrhagica*, as it has been found of value.

Administration.—Turpentine may be given for the relief of flatulence by placing 5 drops (0.3) on a piece of sugar, or in emulsion made by using acacia and a flavoring substance, as follows:

℞.—Ol. cinnamomi	gtt. xx (1.3).
Ol. terebinthinæ	fʒiv (16.0).
Mucil. acaciæ	q. s. ad f℥iv (128.0).—M.

S.—A teaspoonful (4.0) every four hours in typhoid fever.

A more agreeable preparation, not to be used in typhoid fever, is that recommended by Bartholow, as follows:

℞.—Olei terebinthinæ	fʒj (4.0).
Olei amygdal. expres.	f℥ss (16.0).
Tincturæ opii	fʒij (8.0).
Mucil. acaciæ	fʒv (20.0).
Aquæ lauro-cerasi	f℥ss (16.0).—M.

S.—A teaspoonful (4.0) every four hours for tympanites.

When used as an enema the following is useful:

℞.—Olei terebinthinæ	f℥j (32.0).
Olei olivæ	f℥jss (48.0).
Camphoræ	gr. xx (1.3).
Mucil. acaciæ	f℥ss (16.0).
Aquæ	f℥x (320.0).—M.

S.—To be injected as an enema for the relief of *tympanites* and to aid in the removal of *hardened fæces.* Stir thoroughly before using.

The Liniment of Turpentine (*Linimentum Terebinthinæ, U. S.* and *B. P.*) is largely used as a stimulating application to *sprains* and *enlarged joints.*

Turpentine is of service in *ringworm*, applied with a brush to the part affected.

The following preparations are official in the *B. P.: Confectio Terebinthinæ*, dose 1 to 2 drachms (4.0–8.0); *Enema Terebinthinæ, Unguentum Terebinthinæ*, and *Linimentum Terebinthinæ Aceticum.*

The ointment of turpentine is used as a counter-irritant and stimulant to the part to which it is applied. The liniment acts in the same way when applied to sprains and bruises.

UVA URSI.

Uva Ursi, *U. S.*, Bearberry, is the leaves of *Arctostaphylos Uva ursi*, a widely-distributed evergreen shrub. The drug is known in the *B. P.* as *Uvæ Ursi Folia.* Its active principle is arbutin, sometimes called ursin.

Therapeutics.—Uva ursi is employed in medicine as a weak, astringent diuretic, possessing alterative power over the genito-urinary apparatus. It is used in *pyelitis*, *cystitis*, and in *chronic gonorrhœa* or *gleet.* When taken in overdose it escapes from the body as hydrochinone, making the urine dark-colored or black.

Administration.—Arbutin itself is often used in the dose of 3 to 5 grains (0.15–0.35). The dose of the extract (*Extractum Uvæ Ursi*, *U. S.*) is 1 to 4 grains (0.05–0.2), of the fluid extract (*Extractum Uvæ Ursi Fluidum*, *U. S.*) is 2 to 4 drachms (8.0–16.0) three times a day. An infusion (*Infusum Uvæ Ursi*) is official in the *B. P.*, dose 1 to 2 ounces (32.0–64.0).

VALERIAN.

Valerian (*Valeriana*, *U. S.*) is the rhizome and rootlet of *Valeriana officinalis*, a plant of Europe, but cultivated in America. It is official in the *B. P.* as *Valerianæ Rhizoma.* Its active principle is apparently a volatile oil (*Oleum Valerianæ*). It also contains valerianic acid.

Physiological Action.—Valerian is a very feeble depressant to the nervous system, tending to produce nervous rest. In cats it excites sexual activity to a great degree, probably from its odor. When very large doses are given to man, it causes a sense of warmth in the stomach, a slightly quickened pulse, and sometimes nausea and vomiting. Still larger amounts produce purging and mental hebetude.

Therapeutics.—Valerian is used alone or in combination with other drugs to quiet *nervous females* and to relieve *nervousness* and *insomnia.* In *hysteria* it is often very serviceable, and combined with morphine is much used in the treatment of *delirium tremens.*

Administration.—The fluid extract (*Extractum Valerianæ Fluidum*, *U. S.*), is given in the dose of 1 fluidrachm (4.0), and the ammoniated tincture (*Tinctura Valerianæ Ammoniata*, *U. S.* and *B. P.*), in the dose of 1 to 3 drachms (4.0–12.0). These are the best preparations for ordinary use. The infusion, which is not official, is given in the dose of a wineglassful, while that of the simple tincture (*Tinctura Valerianæ*, *U. S.* and *B. P.*) is 1 to 3 drachms (4.0–12.0). The dose of the oil (*Oleum Valerianæ* is 2 to 4 drops (0.05–0.2). An infusion (*Infusum Valerianæ*) is official in the *B. P.* in the dose of 1 to 2 ounces (32.0–64.0).

VALERIANIC ACID.

Acidum Valerianicum is an oily, colorless liquid of a strong odor and burning taste, but is not employed in medicine except in the form of its salts, such as the valerianate of zinc, iron, quinine, or ammonium, all of which are employed, partly for their sedative effects and partly for their influence as tonics.

The dose of *Zinci Valerianas* is ½ to 3 grains (0.03–0.15), that of *Quininæ Valerianas, U. S.*, 1 to 3 grains (0.05–0.15), of *Ferri Valerianas* 2 to 10 grains (0.1–0.65), and of *Ammonii Valerianas* 2 to 10 grains (0.1–0.65). Under the name of "the pill of the three valerianates" Goodell recommends the following in *nervousness* and *hysteria:*

℞.—Quininæ valerianat.
Ferri valerianat., } . . . . āā ℈j (1.3).—M.
Ammon. valerianat.
Ft. in pil. No. xx.
S.—One or two three times a day.

VERATRINA.

Veratrina, U. S. and *B. P.*, is an alkaloid derived from the seeds of *Asagræa officinalis*, and occurs in a grayish powder, which, if it enters the nose, produces violent sneezing which lasts for hours.

Physiological Action.—NERVOUS SYSTEM.—Veratrine has little effect on the cerebrum, but it excites the spinal cord and the voluntary muscles, thereby giving rise to tetanic or tonic convulsions, which are never clonic or epileptoid. The dominant action of the drug is paralytic, and the nervous symptoms just named soon give place to paralysis. The muscles lose their contractile power and the nervous centres are depressed.

CIRCULATION.—In poisonous dose the heart is slowed by the drug, greatly weakened, and finally stopped in diastole, and is found after death to be soft and flabby. In smaller doses it at first slows the pulse by stimulating the peripheral inhibitory nerves and the centres in the medulla, but later these parts are paralyzed. It first stimulates the vasomotor centre, then paralyzes it.

RESPIRATION.—The drug kills by failure of respiration, due to paralysis of the respiratory centres.

TEMPERATURE.—Veratrine always causes a fall of bodily heat.

Poisoning.—The symptoms of poisoning in man are collapse, a pale, cold, wet skin, pinched features, and a rapid, thready pulse, accompanied by violent vomiting and muscular tremors. Tetanic convulsions may come on and resemble those of strychnine in that they arise from the slightest touch or draught of air; after death the muscles will be found to have lost their irritability.

Therapeutics.—Veratrine is never used internally. It is employed chiefly in the form of an ointment rubbed into the skin over parts affected by *muscular rheumatism* and *rheumatic joints* and over *neuralgic nerves*. The official ointment (*Unguentum Veratrinæ, U. S.*

and *B. P.*) or the oleate (*Oleatum Veratrinæ*, *U. S.*) should be used, the latter most carefully, as absorption of the drug may take place in sufficient quantity to poison the patient.

VERATRUM VIRIDE.

Veratrum Viride, *U. S.*, Indian Poke, Poke-root, or Swamp Hellebore, is an American plant largely used for the purpose of allaying inflammation; it is official in the *B. P.* under the name of *Veratri Viridis Rhizoma.*

It probably contains a number of principles, the chief of which are, however, jervine and veratroidine.

Veratrum viride is the safest and best circulatory depressant that we have for use in adults.

Physiological Action.—The physiological action of this drug is to be considered under the effects of its two alkaloids before the complete effect is studied.

Jervine.

When jervine is given in full toxic dose it causes great slowness of movement, relaxation of the muscles, through which thrills continually run, and finally the animal falls to the ground. Violent epileptiform convulsions may now ensue, but no tetanus is present. The convulsions soon give place to paralysis, and are characterized by their lack of force. Sensation is not affected until the near approach of death brings on anæsthesia. There is no evidence of gastroenteritis and no vomiting or purging. The saliva is always increased and pours from the mouth. Death results by failure of the respiratory centres and an almost simultaneous failure of the heart. The heart and circulation are greatly depressed, and the pulse-rate and force are far below their normal rate and strength.

The blood-pressure is very low, except when the convulsion produces a temporary rise, but the condition of the vagi is apparently normal. Jervine acts as a direct depressant to the vasomotor centres. The convulsions are due to the disturbance of the circulation at the base of the brain (Wood), and the spinal cord is directly depressed by the action of the jervine on its motor tracts.

Veratroidine.

This alkaloid is much more irritating than jervine, and in overdose causes vomiting and purging. The muscular twitchings and convulsions caused by jervine are also produced by veratroidine, but are generally not so severe. It also depresses the spinal cord in its motor tracts.

On the circulation veratroidine slows the pulse by stimulating the pneumogastric centres, but finally quickens it if given in very large doses, by paralyzing the peripheral vagi.

The following summary, given by Wood, of the circulatory effect of veratrum viride, from a study of its alkaloids, is so brief and terse as to be worthy of insertion here: "Veratrum viride slows the pulse by a direct depressant action on the heart-muscle (jervine) and by stimulating the pneumogastric nerves (veratroidine); it lowers blood-pressure by an action on the heart-muscle (jervine) and by depression of the vasomotor centre (jervine)."

Poisoning.—Veratrum viride, while one of the most powerful drugs we have, is one of the least dangerous, since it almost invariably causes vomiting before enough of the drug is absorbed to produce serious consequences. The vomiting is partly due to the veratroidine and partly to the presence of an irritant resin. In poisoning, cardiac stimulants, atropine, external heat, the placing of the head below the feet on an inclined plane, and the use of strychnine as a respiratory and nervous stimulant are to be resorted to.

Therapeutics.—The chief use of veratrum viride is as a circulatory sedative in *acute*, *sthenic*, or *dynamic inflammations*. In *pneumonia*, *pleurisy*, *acute hepatitis*, *peritonitis*, and *cerebritis* it is of the greatest value if given at the proper stage, when only congestion or hyperæmia is present. After the onset of the lesions following this period its use is not only valueless, but malpractice. The only objection to the employment of veratrum viride in peritonitis and cerebritis lies in its tendency to produce vomiting, which is, of course, harmful when the peritoneum is inflamed. For this reason aconite is preferred to veratrum viride in peritonitis. Owing to its physiological influence veratrum viride bleeds a man into his own blood-vessels, and the indications for its use are the same in inflammation as they would be for bleeding. In *puerperal fever* it has been highly recommended, but must be most carefully employed. With a large number of practitioners veratrum viride is considered by far the best remedy in *puerperal eclampsia*. If given in this condition the dose must be large, as much as 20 to 30 drops (1.3–2.0) of the tincture. If swallowing is difficult, it may be used hypodermically in half the dose, provided the circulation is carefully watched to avoid too great depression. It acts in eclampsia chiefly by its depressant effect on the motor tracts of the spinal cord. It is also of value in excessive *cardiac hypertrophy* and in the *irritable heart* of strong, healthy men. In *aneurism* where the circulatory disturbance is great and the arterial pressure high the drug may be used, with great care, to decrease the pressure and prevent rupture of the diseased vessel.

CONTRAINDICATIONS.—Veratrum viride is contraindicated in all conditions of depression or exhaustion, and, if vomiting is feared, must not be given in peritonitis or gastritis, as it may cause emesis and in this way disturb and irritate the abdominal contents.

Administration.—The drug in inflammation should be given every half-hour or hour, and at least 1 drop (0.05) of the tincture should be used each time in a healthy adult. In the course of two or three hours or less the skin becomes moist or relaxed, the pulse slower and less [illegible], and slight nausea may be present. These symptoms show that the drug is exerting its influence, and it should now be withdrawn or in very sthenic cases pushed a little farther. If vomiting comes on before the drug has acted on the circulation, 5 to 10 drops (0.35–0.65) of laudanum should be given fifteen minutes before each dose of veratrum viride. The best preparations to employ is the tincture (*Tinctura Veratri Viridis*, *U. S.* and *B. P.*), dose 1 to 3 drops (0.05–0.15). The fluid extract (*Extractum Veratri Viridis Fluidum*, *U. S.*) is given in the dose of 1 to 3 drops (0.05–0.15). Under the name of Norwood's Tincture a saturated tincture has been sold. It is not official, and ought never to be used.

VIENNA PASTE.

Potassa cum Calce, *U. S.*, is a milder and more manageable escharotic than is caustic potash, and is used for the same purposes. (See Caustic Potash.)

WARBURG'S TINCTURE.

Warburg's Tincture is a complex liquid formed by the mixing together of no less than thirteen ingredients. Its inventor, Dr. Warburg, held its composition as a secret for a time, but finally made it public. Since he published the original formula it has been considerably altered, and some of the preparations now sold as Warburg's tincture contain none of the original ingredients. Further than this, some of these ingredients are now not obtainable. It ought to be made as follows, if possible:

Aqueous extract of aloes	28	grains.
Rhubarb	448	"
Angelica-seed	448	"
Elecampane	224	"
Saffron	224	"
Fennel	224	"
Gentian	112	"
Zedoary-root	112	"
Cubeb	112	"
Myrrh	112	"
White agaric	112	"
Camphor	112	"
Sulphate of quinine	1280	"

Dilute alcohol enough to make 8 pints.

The coarse vegetable portions of this list are to be ground into a coarse powder, and the myrrh and camphor, which have been previously pulverized, added to them. The entire mass, less the quinine, is then digested for twelve hours in a well-covered vessel on a water-bath, the alcohol being prevented from evaporating as much as possible. The liquid is now to be strained under pressure and the sulphate of quinine added and dissolved.

Therapeutics.—Warburg's tincture, next to pilocarpine, is the most powerful sweat-producer that we have, and possesses in addition very remarkable antimalarial power. In this last respect it far exceeds quinine as a remedy in pernicious malarial regions for acute attacks and as a prophylactic. Its advantages over quinine rest in its favorable action where congestions accompany the paroxysm.

Administration.—To be of any value Warburg's tincture should be given according to the following rules: The bowels of the patient should be first opened thoroughly by a saline purge, and ½ an ounce (16.0) of the tincture should be given in one dose undiluted, no drink being taken. After the lapse of two or three hours a second ½ ounce (16.0) is given in the same way, and very shortly a profuse sweat appears, which often marks the crisis of the disease, and recovery soon takes place.

ZINC ACETATE.

Zinci Acetas, *U. S.* and *B. P.*, occurs in the form of white micaceous crystals, which are efflorescent and quite soluble in water. It acts as a decided astringent to the skin and mucous membranes, but is less astringent than the sulphate of zinc. It is used as a collyrium in *eye diseases*, such as *conjunctivitis*, in the strength of 1 to 2 grains (0.05–0.1) to the ounce (30.0). In *gonorrhœa* it is often employed instead of the acetate of lead in injections of the strength of 1 to 20 grains (0.05–1.3) to the ounce (32.0) of rose-water.

The treatment of poisoning by acetate of zinc is that adapted to gastro-enteritis. (See Gastro-enteritis, Part IV.)

Chronic poisoning by zinc is very rare; the symptoms consist in muscular palsies, neuritis, and cachexia.

PART III.

REMEDIAL MEASURES OTHER THAN DRUGS.—FOODS FOR THE SICK.

ACUPUNCTURE.

THIS is a term applied to the insertion of a small pointed instrument into the tissues of any part of the body for the purpose of relieving pain, swelling, or dropsies. When used in painful affections it accomplishes its best results in lumbago and sciatica, particularly in the former. When treating lumbago in this manner the writer takes two darning-needles, places them in boiling water to render them aseptic, inserts them at right angles to the skin to the depth of one to one and a half inches, and allows them to remain in place for several minutes. They are then slowly withdrawn, care being taken to prevent them from breaking off. Often after this treatment the patient can at once move more freely, to his great delight. Ringer has, with his usual clear clinical insight, noted that this treatment is more successful in those who have bilateral pain than in those who have one side affected, and the writer has found this statement invariably true.

In sciatica acupuncture is less successful than it is in lumbago, but is always to be tried. The needle should be carried down until it reaches the nerve, and perhaps pierces its sheath, and it must be absolutely aseptic. Bartholow has recommended the use of a hypodermic needle for the simultaneous injection of a few minims of chloroform or morphine. Sometimes the best results are reached from inserting the needle immediately below where the nerve finds exit from the pelvis. In other cases it is asserted that the insertion of a needle on the sound side over a spot corresponding to that which is sore may do good. Acupuncture is useless in acute rheumatism and for the lumbar pain produced by fevers.

Sometimes a rhigolene spray may be used to freeze the skin over the parts with advantage in lumbago or sciatica.

Acupuncture is occasionally resorted to for the relief of dropsy, but it is not commonly employed, although it is often a useful measure. When the skin of the limbs becomes so tense with an effusion as to endanger its life, the tension should be relieved by incisions, not punctures; but saline purges are better for the removal of dropsy, if they can be used. Punctures rapidly close and make hard spots, while incisions remain open and permit free drainage. Immediately after the incisions are made the parts are to be dressed with cotton previously saturated with boric-acid solution and dried, or by absorbent cotton sterilized by baking it in an oven. It is hardly necessary to point out that the incision must be made under antiseptic precautions. (See Antiseptics.)

ANTISEPTICS.

The term "antiseptic," as generally used, does not necessarily imply the power to destroy pathogenic germs. Any substance which inhibits the growth of micro-organisms, which destroys or renders innocuous the poisonous products of their action upon the tissues of the body, or which retards or prevents the absorption of such products is properly termed antiseptic. Since germicides necessarily possess antiseptic attributes, they should, strictly speaking, be classed with antiseptics; in this portion of the work, however, only such drugs as are sufficiently innocuous to allow of their use in the human body or upon its surface will be considered. Some of these—as, for instance, carbolic acid and bichloride of mercury—are efficacious solely from their germicidal properties. Others, and of this class iodoform is the most important and typical example, exert their influence, not upon the micro-organisms, but upon the toxic substances formed by these organisms.

Of the long list of antiseptics which have within recent years received warm commendation at the hands of individual writers, there are comparatively few which have retained the confidence of the profession after prolonged trial. Only these few well-proven drugs will be discussed in this article.

Heading the list, and in its germicidal power far surpassing all others, is *Bichloride of Mercury*. Long since the researches of Koch have shown that this salt is efficacious as a germicide in a watery solution of 1 : 50,000. He stated, however, that where albumin was present the bichloride was decomposed and rendered inert. The same change was observed when solutions were allowed to stand for some length of time, even when distilled water was used as a solvent. By the addition of either sodium chloride or a weak acid such decomposition was prevented.

From this it follows that under ordinary circumstances solutions of bichloride should be freshly prepared, or, if it is desirable to keep them for a long time, a sufficient amount of sodium chloride should be added to prevent precipitation of the mercury salt. Koch advised that as much salt should be added as would equal the weight of the sublimate. Other observers, however, have advised ten times this weight of sodium chloride.

Since whenever bichloride solutions are used in wounds or in cavities [illegible] they are brought in contact with blood-serum or other albumen-bearing substances, care must be taken that the antiseptic powers of the mercury lotion are not destroyed by the decomposition of its active principle. The power of the solution may be preserved by using it in such large excess that the small amount of chemical change has practically no effect, or by combining with it, as stated above, an acid which will not in itself be unduly irritating to raw surfaces. This end is accomplished by tartaric acid. In making up a solution 1 part of bichloride and 5 parts of tartaric acid are added to as much water as is needed. Thus, in making up a solution of 1 : 1000 for surgical purposes, the following prescription may be employed:

℞.—Hydrarg. chlorid. corros. . . . . gr. xv (1.0).
Acid. tartaric. . . . . gr. xv vel ʒj (4.0).
Aquæ dest. . . . . Oij (1 litre).—M.

Bichloride solutions are used in the strengths of 1 : 500, 1 : 1000, 1 : 2000, and 1 : 4000 in the treatment of ordinary wounds. For the irrigation of large cavities solutions of a strength greater than 1 : 10,000 should rarely be employed, and even these dilute lotions have, when used in the peritoneal cavity, given rise to toxic symptoms. The 1 : 2000 solution is the one generally employed for sterilizing wounds and irrigating during operations. The stronger solutions of 1 : 500 or 1 : 1000 are used in cleansing the surface of the body.

The ordinary method of preparing a surface of the body for operation is as follows: The part is first thoroughly scrubbed with green soap and warm water, is shaved, and is washed again as before. It is then cleansed with alcohol or ether, after which a scrubbing with bichloride solution of 1 : 500 should follow, and should be continued for at least two minutes. If no surgical interference is immediately indicated, the whole operative region should be enveloped in towels wrung out in a solution of 1 : 1000 or 1 : 2000, and kept thus protected until the surgeon is prepared to operate. The moment the skin is incised no lotion stronger than 1 : 2000 should be employed, or if the more powerful solutions are used they should immediately be flushed out with one of less strength. The dressings, unless some particular form is used, may consist of boiled, bleached, and sun-dried gauze, soaked in a 1 : 500 bichloride solution and subsequently washed and wrung out in a 1 : 4000 dilution of the same antiseptic.

Next in order of importance and in efficacy among the antiseptic preparations is *Carbolic Acid* and its solutions. The particular value of this drug lies in the fact that its potency is equally developed in both albuminous and non-albuminous solutions. Like the mercury salts, its great disadvantage lies in its toxic properties. It is usually used in solutions of 1 : 20 and 1 : 40. The carbolic acid of commerce is found in a liquid form, dissolved in alcohol, and represents a strength of about 95 per cent. In making the solution for surgical purposes an ounce of this liquid is added to 20 or 40 ounces of water, according to the strength of the solution desired. Although carbolic acid is soluble in 15 parts of water, this solution does not take place immediately, and in making solutions of a strength of 1 : 20 either the water must be hot or a certain amount of time and considerable agitation of the mixture are required, otherwise globules of almost pure carbolic acid are deposited in the bottom of the tray or vessel into which the solution is poured, and these, by coming in contact with instruments or with the hands of the operator, exert an undesirable cauterant effect.

The 1 : 20 solution is used for the disinfection of instruments and the cleansing of surfaces. For half an hour before an operation it is customary to submerge all instruments which will be required in a solution of this strength, and when the surgeon is ready to use these instruments the solution is diluted to 1 : 40 by the addition of an equal volume of water which has been boiled. If a carbolic lotion is employed for irrigation or for cleansing sponges during an operation, it should not be stronger than 1 : 40.

A property possessed by carbolic acid, which renders it an unsafe medium for the impregnation of gauze, is its volatility. After an exposure of a few hours to the atmosphere it entirely evaporates, leaving not an antiseptic, but simply a sterile, dressing. This fact is utilized by the surgeon in the preparation of the deeper layers of the dressing, which come in immediate contact with the lips of the wound. Since all antiseptics are more or less irritating to raw surfaces, healing will be promoted by a sterile rather than by an antiseptic application. By moistening a piece of boiled and sun-dried gauze, sufficiently large to cover the wound-edges, in a carbolic solution of 1 : 20 the antisepticity of this dressing is assured, and in a very few hours the heat of the body causes the entire evaporation of all the carbolic acid, leaving a sterile, non-irritating surface in contact with the wound. If protective is used or oiled silk is applied beneath the dressing, these materials should be treated with carbolic acid in the same way.

In addition to its toxic effect upon the patient, carbolic acid greatly irritates the hands of the surgeon, and if used in a strength of more than 1 : 40 causes so much benumbing of tactile sensibility that manipulative skill is seriously interfered with. The cracked and fissured fingers resulting from the use of carbolic lotions are familiar to all, and at times produce results of far more serious import than temporary pain and discomfort: many recesses are provided in the depths of which septic germs may successfully resist the action of antiseptic washes. There can be no question that septic poisoning has been frequently due to this fact.

Bichloride-carbolic Acid Solution.—Since bichloride, though the most powerful antiseptic, has but little penetrating power and is rendered inert by albumin, and since carbolic, though of more feeble antiseptic strength, possesses the very qualities of penetration and non-neutralization which bichloride lacks, it would seem natural that the best results might be obtained by a judicious mixing of these two antiseptics. In recent times this procedure has been adopted in many clinics and with most satisfactory results.

For cleansing the hands and purifying operation areas, in place of a simple bichloride mixture a solution which represents bichloride

1 : 500 and carbolic acid 1 : 40 is employed. Immediately before operation all sponges are wrung out from this solution.

For flushing wounds, for cleansing sponges during the course of operation, and for the final soaking of the antiseptic dressing immediately before its application, a solution of bichloride of mercury 1 : 4000 and carbolic acid 1 : 100 is employed.

The method of preparing these solutions is of course exceedingly simple. If crude drugs are used, these are put into a given measure of water in sufficient quantity to represent the strength desired, but when, as is frequently the case, these solutions are made up in standard solutions, some thought is required to avoid mistake. Thus, given a standard solution of 1 : 2000 bichloride and one of 1 : 50 carbolic, mixture of these two would make the lotion customarily employed in clinical practice—*i. e.* bichloride 1 : 4000 and carbolic 1 : 100. The calculation involved in making this solution from standard lotions of carbolic 1 : 20 and bichloride 1 : 1000 is somewhat intricate, and liable to result in error; hence it is best either to prepare the entire solution freshly each time or to keep on hand preparations of such strength that the calculation is easily and quickly made.

Iodoform occupies a unique place among antiseptics in having been almost universally accepted and used by surgeons and clinicians, in spite of the fact that its germicidal action has been well proved by laboratory research to be practically *nil.* It is found that nearly all forms of pathogenic germs grow abundantly upon culture materials the greater part of which is made up of iodoform, and that injections of such germs, mingled with large quantities of iodoform, produce the characteristic effect upon living tissues with almost as great certainty as though this drug had not been used; furthermore, it has been shown that iodoform is not even sterile, and that as employed by surgeons it was frequently a cause of infecting previously aseptic wounds.

In spite of this overwhelming evidence against it the drug steadily grows in favor. Recent researches have explained, in part at least, the reason for this contradiction between experimental and practical results. It has been well said that the human body is not a test-tube, and that bacteriological research cannot supplant the evidence of clinical observation. Elaborate investigation showed that this drug acted as a powerful antiseptic, not by destroying the germs, but by undergoing a decomposition in their presence, the products of which render the ptomaïnes, the result of germ-growth, inert. In this way suppuration is, to a certain extent, inhibited, or if present its disastrous effects upon the system at large are prevented, since these are due to ptomaïne absorption rather than to a direct effect of the micro-organisms themselves. It has been apparently proved that ptomaïnes, in themselves and without the presence of micro-organisms, can generate pus, but that where such ptomaïnes are mixed with iodoform before infection no pus is formed. If these septic chemical compounds are rendered inert, a powerful adjuvant to the destructive action of the germ upon living cells is removed, and thus the system is often enabled to overcome one enemy where two would have prevailed. The fact that iodoform is in itself not sterile is, from a practical standpoint, most important. Fortunately, sterilization is readily accomplished. A thorough washing in a 1 : 1000 bichloride solution destroys all micro-organisms, and the powder, after being washed with freshly-distilled water, may then be used without fear of producing infection.

It will be readily understood from the foregoing that iodoform is of little service in aseptic wounds; that it becomes of utility in direct proportion to the foulness of discharge; and that to exert its influence it must be applied directly to the part. It is liable, in suppurating wounds, to form a hard crust with the discharges, thus frustrating one of the most important indications in antiseptic surgery—*i. e.* drainage. Particular care should be exerted to see that the exudation from the surfaces of the wound has a free exit.

As employed in surgery, iodoform, after having been sterilized, is placed in small pill-boxes or wide-mouthed jars, over the opening of which is tied a single layer of antiseptic gauze; through this the iodoform is sprinkled as desired over wound surfaces.

Kreolin, or *Creolin*, a preparation obtained from English coal by dry distillation, has been steadily and rapidly growing in popular favor, and because of its feeble toxic action is often preferred to carbolic acid. In addition to its powerful germicidal effect, it is non-irritant and practically non-toxic. The claim first advanced that this preparation was absolutely non-poisonous can no longer be supported, since cases have been reported where toxic symptoms have followed its use: these were probably due to individual idiosyncrasy, a factor which we can never hope entirely to overcome. It is certainly true that kreolin is the least poisonous of all the powerful antiseptics heretofore used. As an additional advantage, in place of the harsh, irritating effect produced upon surfaces by carbolic-acid solutions, kreolin exerts an influence very like that of an oily or mucilaginous preparation.

The extravagant claims advanced for kreolin in regard to its germicidal property have not been confirmed by bacteriological investigation. In solutions containing albumin it is not efficient as a germicide in strengths of less than 1 : 100, its power being somewhat below that of carbolic acid; since, however, its toxic properties are much less marked than those of the latter drug, it can be safely used in stronger mixtures, and therefore, for practical purposes, its strength is greater.

Kreolin, though insoluble in water, readily forms an emulsion quite as efficacious in its antiseptic properties as a true solution. Since this emulsion is opaque, it is scarcely applicable for immersing and sterilizing instruments, the latter not being readily found. It is admirably suited, however, for cleansing the hands, a 5 per cent. solution neither cracking the skin nor benumbing the sensory nerves. In irrigating large wounds, cavities of the body, and particularly as a means of preventing sepsis or aborting it in gynæcological work, kreolin can be warmly commended. It may be employed in a strength of from 0.2 to 5 per cent.

Barring the opacity of its emulsion in water, it would be the medium *par excellence* for rendering instruments sterile and maintaining them in this condition during an operation.

Among the many antiseptic agents of less importance may be mentioned *Peroxide of Hydrogen*. This drug comes in what is termed a fifteen-volume solution. By this it is meant that fifteen volumes of feebly combined oxygen are contained in each volume of the liquid. It is applicable, not to sterile surfaces, but to suppurating wounds and sinuses. It is alleged that peroxide of hydrogen immediately destroys the micro-organisms of pus, converting, in one or two applications, a septic wound into one which is sterile and which will promptly heal. It is used in the strength of from 5 per cent. up to full concentration. Its disadvantages lie in the fact that it is expensive, that from higher acidity it is often irritating, and that it readily undergoes decomposition. In this latter circumstance, possibly, lies the explanation of its want of popularity, since the preparations vary so greatly in strength that it is impossible to determine to what extent they should be diluted or what may be their potency when applied. When this drug is poured into a suppurating sinus or cavity an ebullition takes place, which ceases only when the drug is exhausted or the infected surfaces are rendered sterile.

Chloride of Zinc has been extensively employed in some clinics as an antiseptic application. It is used in 10 per cent. solutions, and is applied when the field of operation is probably infected by pre-existing pus-formation. Although bacteriological research has shown that this agent possesses feeble antiseptic power, clinical experience demonstrates its great value when applied to infected surfaces. Lately the *Sulpho-carbolate of Zinc* has to a great extent replaced the chloride, as it is less toxic and irritating and far more potent.

For the sterilization of mucous surfaces a saturated aqueous solution of *Boric Acid* is commonly employed.

Double Cyanide of Mercury and Zinc.

This is the latest antiseptic prepared and extensively used by Lister. Though it has not become widely popular, Lister's commendation of it is so warm that a general description of its use is in place.

The drug comes to the surgeon in the form of a fine powder. When employed for charging a dressing it is diffused by means of pestle and mortar in solution of bichloride of mercury (1 : 4000) in sufficient abundance to drench the fabric thoroughly, for which 4 imperial pints to 100 grains of the salt will be found adequate. This will give a percentage of between 2 and 3 of the cyanide to the dry gauze. The gauze should always be used moist, and if it be prepared for immediate use, as by the dispenser of a hospital, the process of drying may be omitted, and the gauze, after being hung up for a while to drain, is further deprived of superfluous moisture by placing it for a while in a folded sheet. It may afterward be conveniently kept moist by wrapping it in a piece of mackintosh cloth. When obtained dry from the manufacturer it should be moistened again with a weak corrosive-sublimate solution before it is used."

The advantages claimed for this dressing are that it is not irritating to the skin, and that the antiseptic substance is not soluble, hence is not washed out by discharges.

An omission of the details of cleansing the hands of the surgeon and assistants in preparing for an antiseptic operation is scarcely permissible in writing upon the subject of antisepsis. The most approved method is as follows:

The hands and forearms are thoroughly brushed in hot soap-suds for several minutes, after which the nails are carefully cleaned by a knife and brush, and the washing again repeated; the hands are then washed in alcohol for one minute, special attention being paid to the nails; finally they are soaked for three minutes in a solution of bichloride (1 : 1000), and during the course of the operation are occasionally washed in a solution of the same strength. If it is necessary to lift a chair, to turn the patient, or to touch any object which has not been previously sterilized, the hands should be enveloped in towels wrung out in 1 : 1000 solution or immediately washed again. Another method which has been found by Kelly to be the best, bacteriologically and practically, is to cleanse the hands and nails by scrubbing with hot water and soap, and then to immerse the hands and arms in a saturated solution of permanganate of potassium made with hot water. After this the skin is decolorized by immersion in a saturated solution of oxalic acid. Finally, the oxalic acid is washed off with hot sterilized water.

ANTITOXIN FOR DIPHTHERIA.

(See DIPHTHERIA.)

CLIMATIC TREATMENT.

(See SPRINGS AND CLIMATES.)

COLD AS A REMEDY.

Cold, or the rapid abstraction of heat, is a remedial measure that can nearly always be obtained, and is possessed of very great power for good in properly selected cases. At the very first we may divide its use into its local application, for a superficial limited, deep-seated, or distant influence, and its general application for the purpose of affecting the entire body.

When cold is applied for its limited and local action it is always used with two objects in view—namely, to cause localized contraction of blood-vessels which through inflammation are engorged so that the parts are reddened and swollen, or temporarily to anæsthetize or benumb a nerve-fibre for the immediate relief of pain, and with the hope that the temporary paralysis may ultimately result in such nerve-changes as to produce a cure.

For these reasons cold, in some form, is a popular remedy for a burn or sprain or any injury likely to be followed by inflammatory processes. In some cases, it is true, hot water or dry heat is equally efficacious, and this fact will be referred to again when speaking of heat. (See Heat.) It may, however, be stated, as an almost invariable rule, that the choice of heat or cold is to be governed by the sensations of the patient, who will generally assert that one of the two is the more agreeable.

Cold or heat causes relief of pain in inflammation by producing contraction of the local blood-vessel walls. As a result, inflammatory exudates do not occur, congestion is relieved, and as the pressure on the nerve-filaments ceases the pulsating pain of inflammation passes away.

A very useful remedy for the sprain of an ankle when it is a recent accident is to let the patient sit with the foot elevated, with a cloth wrung out in ice-water or an ice-bag applied over the part affected.

In the treatment of localized pain cold is used in a number of ways, largely depending in their choice on the will of the physician and the wealth of the patient. The simplest, cheapest, and perhaps the most efficient method of using cold is to place cracked ice in a pig's or sheep's bladder, and, after tying the opening to prevent leakage, to lay the bladder directly on the skin, surrounding it with a towel, so as to prevent the moisture, which appears on the surface from condensation, from wetting the clothing.

Where a very limited and comparatively transient effect is needed, chiefly for anæsthetic purposes, it is customary in hospital and private practice to use a piece of ice sprinkled with a little fine salt, and held against the skin by means of a towel in the hands of the physician. Actual freezing can often be produced very rapidly in this manner. Where a more rapid method is desired, sprays of various very volatile liquids may be driven against the part by an atomizer. Probably the most readily employed of these liquids is ether, which is fairly effective if it is used in a fine spray and driven against the skin in such a way as to favor rapid evaporation. Another of these agents is rhigolene, which is one of the lightest and most volatile of the liquid products of coal-tar, and is used in a spray from an atomizer in the same manner as is ether. Chloride of methyl is a liquid of a sweetish smell and taste, used as a substitute for rhigolene as a local anæsthetic through the intense cold produced by its evaporation. The fluid is directed against the skin over the involved area by means of a nozzle attached to the cylinder containing it. (See Ethyl and Methyl Chloride.)

It is hardly necessary for the writer to repeat that, as the last three liquids are very inflammable, they should not be used near a light or fire.

Aside from the local effects of cold on inflammatory processes, it is largely resorted to for the relief of neuralgia of a superficial type, and has often been used for the cure of deep-seated neuralgias, as over the course of the sciatic nerve in sciatica. Generally, however, it is employed in neuralgia of the supraorbital nerve, where, owing to the superficial position of these fibres, the cold can readily reach them.

The skin should be distinctly whitened and blanched, and even hardened, by the cold before its application is stopped, and if one application does not cause a cure, it may be repeated every day for several weeks in obstinate cases. Sometimes cold is used to benumb the skin or subcutaneous tissues in cases where a minor surgical operation is to be performed, and it is undoubtedly superior to cocaine where one wishes to open boils or small abscesses. It is also valuable when the physician is using the actual cautery, and in all these cases may be employed as is indicated above.

The local employment of cold for the influencing of deeply-seated organs is a well-recognized therapeutic measure of great practical and physiological interest, and is closely associated with the subject of counter-irritation. (See Counter-irritation.) According to Winternitz, cold applied to the feet affects the cerebral circulation, cold to the thighs the circulation in the lungs, and cold to the back the circulation around about the pituitary region. That these assertions are true we do not positively know, but the fact that Winternitz has reached them by a series of experimental studies indicates their correctness to a great extent, and they also find additional support in the popular and medical confidence in the use of cold to the head and heat to the feet in cerebral diseases.

Practically, cold has been employed with no small degree of success in the treatment of pneumonia and pleurisy in the form of the ice-poultice or ice-jacket. The only thing needful for such treatment is a condition of strength on the part of the patient, for it should not be used in adynamic cases. When the ice-poultice is used it is made by taking a mass of finely-chopped ice, draining it of all water, and mixing it thoroughly with dry sawdust in sufficient quantity to absorb all the water derived from the ice as it melts. This is then basted into a quilt, so arranged that all of the contents will not sag to the lower border, and wrapped around the chest, the mass being thoroughly covered by a layer of well-oiled silk. Cold has also been highly recommended when used in pneumonia in another manner, and by no less prominent an authority than Niemeyer, who speaks of it as follows:

"I have made extensive employment of cold in the treatment of pneumonia, and, relying upon a large number of very favorable results, can recommend this procedure. In all cases I cover the chest of the patient, and the affected side in particular, with cloths which have been dipped in cold water and wrung out. The compresses must be reapplied every five minutes. Unpleasant as this procedure is in almost all cases, yet even after a few hours the patients assure me that they feel a material relief. The pain, the dyspnœa, and often the frequency of the pulse are reduced. Sometimes the temperature goes down an entire degree. My patients often retain this surprising condition of improvement throughout the entire duration of the attack, so that their outward symptoms would hardly lead one to imagine the grave internal disorder. The relatives of the patient, too, who do not fail to perceive the improvement, now readily assist in the treatment to which at first they were opposed. In a few cases, and only in a few, the use of cold affords no relief, and the troublesome manipulation for its application increases the distress of the sufferers so much that they refuse to keep it up. In such cases I have not insisted upon the further application of cold.

"In the hospital at Prague every case of pneumonia is treated with cold compresses, and, according to the statements of Smoler, it is exceptional for a patient not to feel material relief from this treatment. I should only ascribe a palliative influence to their use had not the duration of the disease in many instances been decidedly shortened and the convalescence hastened by means of their energetic and methodical employment. In fact, in but few cases have we seen the disease delay its departure until the seventh day. Many have improved on the fifth, and a very large number as early as the third day; nay, I have repeatedly found it impossible to keep patients with recent pneumonia in the hospital for a longer period than a week. Cold is rightly regarded as one of the most efficient antiphlogistics in inflammation of external organs. Its action is directly tonic upon the relaxed tissues and dilated capillaries."

In endocarditis, and especially in pericarditis, do we find an ice-bag placed over the heart a valuable remedial procedure, for it relieves palpitation and quiets the heart, decreases the pain and diminishes the inflammation.

The use of a cold bath for the purpose of increasing the tone of the system is as old a custom as any which we have, but, like all other things in medicine, cannot be used without distinct indications for its employment, or, to speak more correctly, the absence of certain contraindications. The most universal exception to its use which we find is that class of persons with whom bathing of any kind, particularly when it is frequently repeated, does not agree. The writer is sure that a much larger number of persons belong to this class than is generally recognized, and he has seen cases of nervous exhaustion and general loss of vivacity and vitality occur as a result of too frequent bathing. This is the case more especially with daily bathers who use cold or warm fresh water, particularly if the bath be taken in the morning.

Before passing on to a consideration of the physiological action of a bath, and why and when we should use it, it is proper to call attention to the fact that a very large proportion of children who are bathed daily are allowed to lie and soak in the tub, and as a result become debilitated and fretful, only to recover when the bath is used once or twice a week, and replaced in the interval by a nightly sponging off with salt and whiskey or salt and water.

Through practical experience and much experimental research of a more or less reliable character, we now know that the following phenomena accompany the use of a cold bath in a healthy person with whom such a bath agrees:

On entering the water he shivers, thinks it almost unbearably cold, his teeth chatter, and he gasps if the cold suddenly touches the belly-wall or an equally sensitive surface. In a moment, however, reaction sets in, and the extremities, heretofore blue, trembling, and covered with *cutis anserina*, become warmer and flushed. The pulse is increased in force and frequency, and the respirations are deeper and more thoroughly performed. As a result of this each portion of the body receives a more perfect supply of blood and feels rejuvenated. Following this stage of exhilaration, a third comes on, in which the blueness and depression of the first stage recur in an exaggerated degree, but this condition does not ensue unless the person remains too long in the water. If he leaves the bath while in the acme of his exhilaration, the stimulus may remain with him throughout the rest of the day.

The reason for the occurrence of this train of symptoms is not far to seek. The chilliness of the first stage shows that the great abstraction of heat is lowering the bodily temperature, the centres for calorification in the body not manufacturing all the heat that is needed for the preservation of the normal temperature. At first the cold drives the blood hurrying into the warm recesses of the body, leaving the surface of the body cold; but in a few moments the system is aroused to the recognition of the fact that it must increase its exertions in the propulsion of blood and manufacture of heat, and so, with an effort it puts forth all its power, picks up each corpuscle that is hiding from the cold in the internal organs, and, after imbuing it with warmth obtained by increased heat-production in the sources of heat-manufacture, forces it out to the surface of the body along with its fellows, which are driven to all parts of the system. This is not a mere figurative way of putting the matter, for cold always contracts blood-vessels and reflexly stimulates the vital centres to increased activity.

When the bath is too prolonged the result of over-stimulation ensues, and the depression of the nervous system and circulation may be sufficiently severe to interfere greatly with normal functional activity.

Just at this point it becomes clear why persons "catch cold," or, more technically speaking, are attacked by local or general congestions. One person who is weak may never reach the stage of stimulation of which we have just been speaking, because his system has not enough units of force in it to unite and expend them upon the functional activities named, and, as a consequence, the blood, which at the first shock has hurried into the internal viscera, is not driven back to its duty, but, sulking in its retreat like a deserting soldier, allows disaster and disease to ensue because its superior officer, the central nervous system, cannot gather together enough force or authority to make it do its duty. These cases present evidences, therefore, of circulatory and systemic depression or have congestion of the lungs, liver, or other parts. In the strong person exactly the same state of affairs obtains in the third stage of depression, but only after the strength of the system has been expended in the activity of the stage of exhilaration.

Cold salt baths, particularly if they are sea baths, are more stimulating and not so relaxing as is fresh-water bathing.

Cold effusions to the head, and, better still, the use of an ice-bag, have long held a high position in the treatment of meningitis and head injuries, and a hot bottle to the feet and cold to the head will often cause sleep in persons who habitually suffer from insomnia. This is particularly the case with those persons who have wakefulness from mental overwork. On the other hand, cases with insomnia from cerebral anæmia do well if a cold plunge-bath is taken before going to bed, although in still other cases a hot bath is more efficacious. (See Heat.) The latter instances are not due to anæmia, but to nervous irritability, which the heat quiets, whereas the insomnia of cerebral anæmia is relieved by a cold plunge by reason of the increased circulatory activity produced by the bath.

When cold is to be applied to the head continuously, it is often convenient to employ a coil made of rubber tubing and so shaped as to fit the vertex. One end of the tubing should reach to a tub of cold water on one side of the bed and the other to an empty tub on the other side. By sucking on one tube siphonage is established, and as soon as the liquid has been transferred from one tub, the stream may be reversed and the water passed back again to its former receptacle.

The use of a cold bath after a person becomes heated is popularly supposed to be dangerous. On the contrary, every athlete knows that nothing is so refreshing and so preventive of muscular stiffness after severe exercise and sweating as a cold plunge- or shower-bath; but he also recognizes the fact that a plunge is all that is permissible, and it is only the person who possesses the healthy circulatory power which will enable him to rebound from momentary depression to increased activity that should resort to such procedures.

Cold water dashed or sopped against the perineum or the scrotum and the lumbar region is a favorite remedy for nocturnal seminal emissions with some practitioners, and the scrotum may be submerged in a tumbler of cold water for a few minutes at night for a similar purpose.

A very useful treatment of dysentery is to gently inject into the rectum about one or two quarts of cold water—if necessary it may be icy cold; and a similar application for piles is a useful adjunct to all forms of treatment for these troublesome formations.

So highly do some physicians praise this method that the writer has thought it proper to quote from a paper of Dr. J. William White upon this subject. He says:

"I desire to call the attention of the profession to a method of treatment which, although not altogether new, is yet not appreciated as, in my judgment, it should be. I refer to a moderately forcible stream of water of varying temperature in the treatment of a number of affections of the rectum, anus, and genito-urinary apparatus. The tonic and astringent effect of such a stream of water upon any living tissue is, of course, a well-understood fact, and has been employed in the arrest of hemorrhage, in the treatment of inflammation, and in various conditions. But it has only been in exceptional cases, and usually by the aid of more or less troublesome apparatus, that it has been used in the class of cases to which I now refer.

"The bidet, as I have now for a few years prescribed it, should be of the variety which can be attached to the water-closet seat habitually used by the patient. It should have a nozzle capable of throwing a stream of about the calibre of an ordinary lead-pencil or a little less. The head of water should be sufficient to make it impinge upon the parts exposed to it with enough force to excite there a little sensation of smarting or tingling. That degree of force will, for example, be sufficient to enable the patient to take an enema, or, if a female, to take a vaginal injection. The bidet pipe should be movable by means of a handle, so that the stream can be directed against any portion of the external genitals, the perineum, the anus, or the surrounding parts. It should also have connection with the hot and cold water-supply of the house, so that the water may be used of any temperature which the physician may prescribe or which the sensations of the patient may make desirable. Stopcocks should regulate the size and force of the stream, and should be so placed as to be easily reached by the hand of the individual sitting upon the water-closet seat. Such an apparatus can be put in place by any experienced plumber in any ordinary water-closet at an expense of from fifteen to twenty dollars, and, in Philadelphia at least, the usual head of water obtainable even in third-story rooms is quite sufficient for all therapeutic purposes.

"The diseases in which it may be desirable to use this method of treatment may be divided into two classes: First, those affecting the lower end of the bowel and its outlet; second, those involving the genito-urinary system. Among the first the most important are hemorrhoids, internal and external, prolapsus ani, and slight cases of prolapsus recti; pruritus ani and eczema of the margin of the anus should also be included in this group of cases, in which it has now for some time been my habit to prescribe the systematic employment, twice daily, of the bidet, one immediately after the daily stool, and for the second time, by preference, just before going to bed. As a rule, in all the midwinter months the ordinary temperature of the Schuylkill water is that to be preferred, although I am largely governed by the feelings of the patient in this respect. An enema should be taken at each of these times, the lower portion of the rectum being thus thoroughly washed out at least twice daily, after which the stream of water is allowed to play upon the affected region for a period of from five to fifteen minutes. The ordinary and useful effect of cool sponging or washing immediately after stool in cases of hemorrhoids is by this means enormously increased. Internal hemorrhoids will, under this treatment, in many cases almost entirely disappear, unless they are exceedingly large and have been frequently inflamed or strangulated and badly neglected; external hemorrhoids, even when fleshy, will shrivel and become scarcely noticeable.

"I could detail a number of cases of this character taken from my practice of the last two years. In some instances in which I had been informally called in, at intervals of a few months, in the case of old people, the result has been practically their disappearance from my list of patients; and they speak in the warmest manner of the great comfort derived from this simple method of treatment.

"Perhaps nothing is more distressing among minor affections than the trouble described as pruritus ani, and variously attributed to liver disease, constipation, gastric troubles, latent gout, uterine disease, parasites, neuroses, and a number of other causes, varying from eating of shell-fish or excessive smoking to alleged hereditary predisposition. There are very few practitioners of any experience who have not discovered how difficult it is in any particular case of pruritus to assign distinctly the annoying symptoms to any one of these causes. Often the whole list may be carefully gone through and eliminated, or the proper remedies may be applied successively, as different theories are adopted, without the slightest benefit resulting. Ointments, lotions, and ordinary cool bathing will be tried in great variety, but without avail, and such patients will often go from one physician to another or fall into the hands of quacks while seeking proper professional relief. My list of cases of this character which I have now treated by means of the 'bidet' comprises eight.

"Nearly all my cases have resulted in cure, requiring to attain that end simply different lengths of time of the application of the douche, with variations of the temperature of the water and occasionally the use of some emollient salve. I have been particularly struck by the fact that these cases include among their supposed causes widely distinct conditions, and the uniformity with which they have yielded to this simple treatment has led me to regard with suspicion the orthodox etiology of the disease. In procidentia ani and in slight cases of prolapsus recti I have had very satisfactory, though of course less striking, results. In a few instances the trouble almost entirely disappeared, and in all of them it was distinctly relieved. These cases require for their successful treatment a much longer application of the douche, and the water should, in my judgment, be at one or the other extreme of temperature—either quite cool or as hot as can be comfortably borne.

"I am quite aware that the use of cold water in these affections is not in the least a novel plan of treatment; but the method under consideration combines the effects of temperature with a sufficient force of the stream, and admits of the prolonged application of the remedy without effort on the part of the patient, who is in the most suitable position for this treatment—practical points which induced me to make this mention of my results in rectal and anal cases.

"Agnew says of pruritus that among the local remedies frequent ablutions with cold water should be mentioned, and of prolapsus ani et recti that 'in all cases where remedies have proved unavailing, or where patients have declined an operation, much good may be done by douching the parts with cold water and applying an oiled compress;' and Allingham says of the same class of cases that 'the frequent and bountiful application of cold water is to be most strongly recommended;' but few authors, so far as I know, have especially alluded to the method of application by means of a bidet.

"My second class of cases includes, chiefly, certain prostatic troubles, varicocele, atonic impotence in the male, and pruritus of the vulva or vaginitis in the female. In case of variocele, although I have not succeeded in effecting a cure in any instance by this method, I have certainly seen advancing enlargements of the spermatic veins becoming stationary, long relaxed and pendulous scrotums become firm and much smaller, and the mental condition of the patient, which is so important an element in many of these cases, shares in the improvement. In chronic prostatitis, a most intractable and distressing ailment in many instances, it has come to be a part of my routine treatment to order the use of cold perineal douches by means of the bidet, associated with frequent cold enemata given in the same manner; and I believe to-day that if I had to discard all therapeutic measures but one in these cases, I would retain this one. In a certain number of cases of impotence associated with general muscular weakness, loss of tone, lack of general strength and vitality, accompanied by imperfect or rapidly-subsiding erections, I have found that the cold douche applied with some force and for considerable lengths of time to the perineum and testicles has been productive of marked benefit.

"In two cases of pruritus vulvæ my results have been good, though less striking than in similar disease affecting the region of the anus. In vaginitis, where the woman has sufficient intelligence to learn how to take an injection by means of the bidet, it offers an admirable method of cleansing the vagina, of carrying away thoroughly all accumulated secretions, of reducing heat and swelling, and at the same time of avoiding the frequent introduction into the inflamed canal of a foreign body in the shape of the nozzle of a syringe. My opportunities for observation in this class of cases have been limited, owing to the disinclination of these patients to procure the bidet, and owing to their irregular habits of life and their frequent changes of residence; but I have seen enough of its good results to make me feel confident that it is a valuable addition to our therapeutic agencies.

"After all, in every one of the cases which I have mentioned its use is simply the application of the most elementary and common-sense principles to every-day practice, but I am satisfied that this particular method of applying these principles has not received the attention which it merits."

Cold in Fevers.

The proper manner to employ cold water in fever should be thoroughly understood. It may be used at a number of temperatures, according to the effect desired, such as cool, moderately cold, and very cold.

Very commonly in the course of a fever the patient is restless, uncomfortable, and sleepless, yet has not a temperature fraught with any harm. Such a case may be sponged off with tepid water or with a little alcohol and water, or salt and whiskey, with great benefit in the production of sleep, the reduction of fever, and the advantage of nervous quiet. Sometimes the sponging is successful when used only over the arms and legs, but more frequently it should be extended at least to the spinal column.

If tepid sponging does not lower the fever in a given case, then ordinary cool tap-water should be employed; and it is well to remember that the secret of successful sponging lies in the use of a sponge not saturated to overflowing, but only sufficiently wet to leave a thin film of moisture on the skin, which cools the patient by its rapid evaporation and does not wet the clothes and the bed.

There are many cases where sponging, even with ice-water, fails to reduce the fever, and in these the fever must be lowered by the "cold pack," as it has been called. The name is unfortunate, as it is indicative of a very severe exposure, which really does not occur. The application is carried out as follows:

A small canvas cot should be placed by the side of the bed of the patient and covered by a large rubber cloth, which, by being raised at the head and depressed at the foot, forms a channel for the water. Over this, again, is placed an ordinary sheet. The patient, after being stripped, is laid upon this sheet, which is then folded over him, and a fine spray from an ordinary watering-pot for flowers allowed to play upon his body from end to end. The temperature of the water depends upon the effect required. The bed should be so arranged that the water will not remain in puddles under the patient, but drain off constantly into a bucket at the foot. The sheet being wet allows evaporation to go on, and a rapid fall in the fever results.

It is of the greatest importance that the attendant lightly but briskly rub the patient all over with the hands, so as to bring the blood to the surface and prevent internal congestions. Another point of very great importance is that cold should be applied to the head while the patient is being bathed.

During this procedure the thermometer should be placed in the mouth or pushed deeply into the rectum, and the fall in the temperature watched. As soon as it reaches 101° or 100° F. the bath must cease, lest the fall continue and collapse ensue.

On the removal of the patient the surface should be gently dried with towels, and the bed-clothing consist of only a sheet, or a sheet and one blanket in cold weather. Above all things, it must be remembered that the patient is not to be *wrapped up* in a blanket, and not only this, but that he must not be placed in a blanket while still in a wet sheet. The wet sheet, if surrounded by a blanket, soon places the patient in a typical Russian or warm moist bath, calculated to to raise instead of lower the fever.

Where sunstroke (thermic fever) is present the patient may have chopped ice applied or be put directly into a bath-tub of ice-water, but in any event the attendants must rub the patient's skin to bring the hot blood to the surface and prevent congestions Cold water may also be injected into the bowel in cases where the skin is cold, but the central temperature very high. (See Enteroclysis.)

The treatment of rheumatic hyperpyrexia by cold is quite as suitable as is this treatment of other fevers when the hyperpyrexia is so excessive as to endanger life.

The presence of pneumonia and bronchitis does not contraindicate the use of cold in fevers, and no fear of "cold being taken" need exist unless the bodily temperature is lowered below the normal point. According to Liebermeister, intestinal hemorrhages contraindicate the use of cold, but this statement has been contradicted by no less a writer than Wunderlich.

(For Brand's cold-bath treatment of typhoid fever see Typhoid Fever.)

COUNTER-IRRITATION.

Counter-irritation is a term applied to the use of substances irritating to the surface with which they come in contact, and employed for the purpose of influencing morbid processes in more or less distant parts or of affecting the general system. It has been thought that this method savors of the doctrine of "like cures like," but in reality it is based on sound physiological laws, and is so logical as to have been described by the founder of homœopathy as useless.

The entire basis for the employment of counter-irritation rests upon reflex action, or the conduction of a nervous impulse to a centre, which, when so stimulated, sends out an impulse to the part of the body which is diseased.

The use of counter-irritation may be divided into four parts or purposes: The first is for affecting inflammations or congestions; the second for causing the absorption or removal of inflammatory deposits after true inflammation has ceased; while the third purpose is for the relief of pain; and the fourth for the effect which can be exercised upon the general system by blisters in systemic disease.

In the same manner that we can divide the indications for counter-irritation into four parts, so can we also divide its forms into three varieties, according to their severity. The most severe are the caustics or escharotics, the next the epispastics or blisters, and finally the rubefacients or reddeners.

The proper manner of employing a counter-irritant to affect inflammations is not to apply it directly to an actually inflamed area, but a little to one side of it or at a spot known to be connected intimately with the diseased area by nerve-fibres.

Thus, it is well known that in diseases of the eye the blister should be applied back of the ear, and that in abdominal neuralgia or in pleurodynia the best results are reached, not from the application of a blister to the spot where the pain is felt, but to the point upon the vertebral column where the nerve at fault takes its exit. The reason for this is that pain is always referred to the peripheral end of an irritated nerve, and pleurodynia or abdominal pain often arises from vertebral disease or inflammation about the spinal ligaments or the foramina of exit for the nerves. In a similar manner we sometimes apply a blister, in the early stages of hip disease, not to the knee or ankle, where the pain is felt, but at the seat of the trouble—namely, the hip. Counter-irritation is contraindicated by the presence of any acute inflammation directly under the spot where it is proposed to place a blister; that is, if any reddening of the skin is present the blister or other form of irritation must not be applied there. If used at all, it must be some little distance away, or a series of small flying blisters should be placed around the inflamed zone. A flying blister is one which is small in area—say as large as a Lima bean—and of comparatively slight action, healing rapidly after its primary effects have passed by.

Among the inflammatory affections in which we find counter-irritation very serviceable may be mentioned pleurisy, pneumonia, iritis, synovitis (rheumatic or traumatic), cerebritis, and peritonitis (acute or chronic). A host of more subacute or chronic inflammations are also benefited by this measure, some of which are gleet, chronically enlarged joints, and inflamed glands. In all these states the blister, or more rarely the rubefacient, is to be resorted to; and while it is true that nearly all of these conditions are accompanied by fever, and that fever is generally held to be a contraindication to the use of counter-irritation, blisters undoubtedly do good at such times. In pneumonia or pleurisy, along with the use of veratrum viride in the *very earliest* stages of the disease, a cantharidal blister of the size of a silver dollar should be applied near the spot where the most pain is felt or on the back near the spine. Where joints are inflamed the blisters should be at some distance from the seat of the swelling, although it is often useful to place the counter-irritant on the inner or outer aspect of the knee-joint if the skin is not reddened. In peritonitis the blisters are best applied directly over the seat of tenderness, and in cerebritis at the nape of the neck. In gleet a little cantharidal collodion may be painted along the under surface of the penis or upon the perineum with great advantage in obstinate cases.

Where an inflammatory process is chronic and resists cantharidal blistering, then resort is often had to more severe forms of counter-irritation by means of the red-hot—*not* white-hot—iron, or the use of escharotics, such as caustic potash or caustic soda or arsenic. The reason for using these is that they all cause so much tissue-change in the part that the counter-irritation is very prolonged. Sometimes antimonial ointment is applied constantly until a slough forms, to accomplish the same purposes.

For the removal of the products of inflammation we resort to cantharidal blisters or drugs possessing powers as local irritants and at the same time as alteratives. Thus, in pleurisy with effusion it is very proper to employ a good-sized cantharidal blister if the effusion has a tendency to remain unabsorbed. Some have thought that the absorption which follows is due to the abstraction of serum which takes place in the bleb formed, but this is a mistaken idea, as one often sees an effusion absorbed which far exceeds in quantity the amount of liquid in the blister. Under these circumstances the spot for applying the blister is, as a rule, immediately under the arm, about two or three inches below the axilla. The blister, while it is useful in causing absorption in chronic effusions and deposits about joints, is not so good as are alterative irritants; for example, iodine, which in the form of a thorough application at one sitting until the skin is black—not yellow or red—is often of service. In other cases, particularly in very chronic states, iodine ointment, alone or with lard, may be rubbed into the parts with advantage, care being taken to stop its use for a day or two as soon as the skin gets red. This same treatment is also useful in treating enlarged glands in the neck and elsewhere.

One of the best treatments for epididymitis is to paint the scrotum black with many coatings of a strong solution of silver nitrate or iodine, to insist on total rest in bed, and to resort to the local use of cold. The testicles should also be supported by a suspensory or adhesive strips during this treatment, and aconite given if fever is present.

For the relief of pain we very commonly resort to the rubefacients rather than epispastics, since the more moderate applications are equally effective in most instances, and do not leave skin lesions behind to remind the patient of his attack.

Every one who has had stomach-ache and remembers the relief obtained by the use of a mustard plaster or spice plaster recognizes the value of this means of obtaining relief, and it only remains for the writer to state that headaches are often amenable to similar treatment. These headaches may be neuralgic or due to dyspepsia or to cerebral anæmia or congestion, but counter-irritation will nevertheless do good. If neuralgic, a little menthol or oil of peppermint may be applied over the course of the nerve—which application, if it be supraorbital, will require care lest the oil gain access to the eye.

For the treatment of pain in the belly or chest or elsewhere we have four means of producing counter-irritation in the shape of rubefacients: The first is mustard; the second, capsicum; the third, the turpentine stupe; and the fourth, the spice poultice.

The mustard plaster should be made by mixing mustard flour with warm vinegar or water, and adding varying proportions of ordinary flour to modify its action. If the skin is tender, half mustard and half wheat flour may be employed, or if a child is to be treated the proportion may have to be only one-fourth mustard. The plaster is made by placing a stout piece of paper on a table and putting over it a piece of heavy muslin or linen. On this is smeared the mustard, and over the mustard mass is placed a thin piece of linen, which prevents the poultice from adhering to the skin and modifies the burning according to its density. By folding the edges of the paper so that it resembles a picture-frame we have at a hand a cheap, effective, and strong plaster, the back of which is supported by the paper.

The spice plaster is made by mixing equal parts of allspice, cloves, cinnamon, and nutmegs, and adding thereto one-half part of black pepper. These constituents are made into a homogeneous mass by using a knife-blade to mix them, and are then sewed up in a bag which is quilted to prevent sagging of the contents. One side of the poultice is now wetted with warm brandy, whiskey, or vinegar, and applied to the part desired.

If the skin is tender the proportions of pepper and cloves should be decreased.

This plaster may be allowed to remain over the affected parts for hours or even days, and is very useful in the treatment of gastric catarrh and indigestion, particularly those forms occurring in children.

The turpentine stupe (see Turpentine) is not to be allowed to remain very long on the skin, as it may blister a tender cuticle, and the pepper plaster may be so active as to produce unbearable pain if it is not watched.

The proper way of treating all such burns from counter-irritation is to apply simple cerate, cosmoline, or sweet oil, to which may be added carbolic acid in the proportion of 1 : 100. The carbolic acid not only acts as an antiseptic, but as a local anæsthetic, while the oil acts as a protective from contact with the air.

Much difference of opinion exists as to the proper treatment of the blister formed by cantharides. Where the blisters are small—that is, the size of the end of a finger—they may be allowed to break of themselves, and then be dressed with dry cotton; if they are large, the blebs should be punctured at their most dependent part with an antiseptic needle and dressed with dry absorbent cotton, as by so doing the new skin rapidly forms underneath and is soon able to carry on its normal functions.

The proper treatment of the blister while it is forming is to apply a poultice, which will decrease the pain and aid in the formation of the bleb.

DISINFECTION.

Before discussing the subject of Disinfection, we must turn our attention to what we mean by the terms employed when speaking of this subject. At present we recognize that the word "germicide" is a term applicable solely to agents capable of killing the lower forms of life, whereas "antiseptics" are substances which simply render the material with which they come in contact so antagonistic or unsuited to germ-development as to render their presence for any length of time impossible, at least in an active state. To use a simile: the killing of the inhabitants of a district by shooting them would stop all growth and be germicidal, whereas the destruction of crops in these same parts would only be antiseptic; or, in other words, the people might remain, but would have to starve to death. (See article on Antiseptics.)

We now speak of germicides as disinfectants, but never of antiseptics as disinfectants if we use these terms correctly. "Germicide" and "disinfectants" are therefore synonymous words.

From what has just been said it is evident that we should always resort to disinfectants rather than antiseptics, for although the latter are good, the former are better.

We have three ways of destroying germs which are particularly useful: The first is the total destruction not only of the germs, but also of their resting-place, by means of fire, which may be used in the case of old furniture, mattresses, and similar materials, and which may be extended to everything about the patient if it is necessary to stamp out a brisk epidemic before it can get well under way. The second is the use of moist heat in the form of superheated steam, or, better still for common purposes, the use of boiling water; and, thirdly, by means of disinfectant materials which have a proved reliability.

Moist heat in the form of superheated steam is infinitely preferable to dry heat, but as superheated steam cannot be readily obtained, physicians usually direct the clothes to be boiled for at least two hours.

Very often the bed-clothes are taken from a sick-room, trailed through the house, and finally deposited at any spot until a convenient time for boiling them occurs. This is radically wrong and capable of causing a widespread distribution of the disease. In all such cases the bed-clothes should be rolled off the bed in a bundle and completely submerged in a bucket or tub of boiling water, or, better still, in a corrosive-sublimate solution of the strength of 1 : 1000, before they are taken from the room. This tub is now to be carried at once to the fire, and the clothes lifted out dripping wet and plunged into a clothes-boiler in which the water is actively boiling. The lid of the boiler is at once to be put on to increase the heat and prevent the escape of any germs in the steam or in the hot air which arises from the surface of the water. The active boiling should be continued for one or two hours, and water be continually added to prevent scorching of the contents of the boiler.

It is important that food be not cooked on the stove at the time the clothes are being boiled, and no food should be in the room.

If boiling cannot be resorted to for any reason, the clothes may be soaked in a 1 : 500 solution of corrosive sublimate or a 1 : 20 solution of carbolic acid, although neither of these is so sure a method of disinfection.

The proper care of a room after it has been occupied by a case of infectious disease is of great importance, and is generally sadly mismanaged. Very commonly sulphur is burnt, and this, as usually employed, is perfectly useless, owing to leaking windows and doors, which permit most of the generated gas to escape.

To be of any value the burning of sulphur must be preceded by packing the window- and door-cracks with cotton or soft paper. Broken roll-sulphur is moistened with alcohol, which is then lighted.

By far the best method of disinfection is to take all movable objects out of doors into the fresh air, and then to wash the floor, sills, and casings, using a scrubbing-brush, hot water, and soap. The water remaining in the bucket should afterward be boiled to kill the germs which may be in it. This scrubbing being accomplished, the same surfaces should be scrubbed a second time with a solution of corrosive sublimate (1 : 500 or 1 : 1000), and left wet, so that the salt of mercury may remain on them. Cracks and crannies are to receive particular attention. If corrosive sublimate cannot be used, then carbolic acid (1 : 10 or 1 : 20) may be resorted to.

By far the best disinfectant for all diseases is good ventilation. Not only should as much air as possible be allowed to enter the sick-room, but after the case has vacated the premises the windows should remain open for weeks if possible. Fresh air dilutes germs as fresh water dissolves or dilutes dirt.

Disinfection of the discharges of the patient is an important duty to be remembered. The urine and fæces should always be received in a vessel containing enough corrosive sublimate solution (1 : 500) to kill all germs, and to prevent their escape into the air or into water or food when the discharges are thrown away. *The disinfectant should be placed in the bed-pan before, not after, it is used.*

The bed-pan or chamber should not be allowed to stand in the room, but be removed and emptied at once in such a manner that it cannot contaminate any water or food. Its contents should not be thrown upon the ground, as the air will dry them and cause the germs to fly in the form of dust anywhere and everywhere. In very contagious diseases bathing or swabbing off the patient with weak antiseptics may be tried. Thus 1 : 10,000 of bichloride of mercury may be used and the patient afterward wiped off with a wet towel. In other instances a 1 : 100 solution of carbolic acid in sweet oil may be employed to soften the skin, decrease itching, and disinfect the patient.

The question as to which are the best disinfectant substances is one which has attracted the attention of physicians and original investigators for years. The result of a vast amount of study and experience shows that corrosive sublimate is the best of all disinfectants in the proportion of 1 : 250 to 1 : 500, or even weaker, but that for cheapness, activity, and general usefulness chlorinated lime is better still. The disadvantages in the use of corrosive sublimate lie in its ready decomposition, its formation of an albuminate when albumin is present, its uselessness where lead pipes are present, and, above all, its expense. Chlorinated lime depends entirely upon its chlorine for any disinfectant power which it may possess. Chlorine gas itself is not readily handled, but the lime enables us to put it where we will. It cannot be employed to disinfect colored fabrics, as it bleaches them. (See Formaldehyde, Part II.)

Whenever chlorinated lime is bought the physician should see that all the chlorine has not departed from it, as most of the material kept in the stores is so old as to be worthless.

For scrubbing floors, chlorinated lime may be made into a solution by adding a cupful to a bucket of water, and in privies it may be spread thickly over the surface of the mass of filth.

It is useless to place chlorinated lime around the room for the purpose of disinfecting the air, as the amount of chlorine to the volume of air to be disinfected is as nothing.

Copperas, or sulphate of iron, while largely used as a disinfectant by some persons, is in reality only an antiseptic.

ENTEROCLYSIS.

Enteroclysis, or the washing out of the bowel by means of large and slowly injected clysters for the purpose of medicating or cleansing both the large and small intestine, has within the last few years become one of the most valuable therapeutic measures we possess. Not only is it of value for the purposes named, but for the relief of intestinal obstruction, for the preservation of bodily heat by the use of hot water, and for the reduction of fever by the use of cold water.

The treatment of choleraic diarrhœa in all its forms by enteroclysis was first used by Cantani within the last decade. The method yielded such good results in his hands that he enthusiastically employed it in a large number of cases, and caused a number of other physicians to use it. The method consists in the slow irrigation of the large and small bowel by way of the rectum by means of a solution urged on by the hydrostatic pressure of a fountain-syringe. The solution contains as its chief constituents tannic acid, which is added in the proportion of from 1 to 5 drachms to 2 quarts of water, with 1½ ounces of wine of opium.

Carbolic acid is too poisonous, salicylic acid too insoluble, corrosive sublimate too poisonous and too easily decomposed, to be used in this manner.

In some cases Cantani employed a mixture made of

Infusion of chamomile-flowers	2000 parts.
Tannic acid	10 "
Gum arabic	30 "
Tincture of opium	2 "

Cantani considers that the passage of the ileo-cæcal valve is essential for the success of his methods, and if this is the case the reporters who have failed to obtain satisfactory results from this treatment have probably failed to do more than irrigate the colon. The importance of irrigating the ileum is great, since it is in this portion of the alimentary canal that the cholera germs are most active. Nor is this treatment by tannic-acid injections founded upon mere empiricism, for Cantani and others have found that tannic acid, in the strength of 1 per cent., inhibits the growth of intestinal germs in one and a half hours at 98° F., while ½ per cent. in six hours seriously impairs their vitality. Cantani also asserts that tannic acid neutralizes the toxines formed by these micro-organisms. This treatment therefore contracts the leaking blood-vessels, stops the growth of the bacilli, prevents the absorption of toxines, acidifies the intestine, stimulates the nervous system, warms the body, prevents anuria, and avoids collapse. Many clinicians, however, do not believe that it is possible for the fluid to get by the ileo-cæcal valve unless so great hydrostatic pressure is used as to be dangerous.

The employment of irrigation of the colon in cases of dysentery is by no means of recent date. It is only, however, within the last few years that this method of treatment has been widely employed or considered. Aside from the fact that we can bring medicaments in direct contact with the diseased mucous membranes, there is no doubt whatever that the mere passage of water at suitable temperatures over the bowel-wall is of value, since by this means we remove mucus and pus, and so dilute the poisons manufactured by the germs of the disease that their further action is largely inhibited. In adults the use of irrigation in dysentery should be carefully carried out by means of an inflow and outflow tube, the first being attached to a fountain syringe. The outflow tube must be large enough to permit of the liquid leaving the bowel with a readiness equal to that of its inflow, and must be so straight and patulous as to permit of the fluid carrying away with it any flakes of mucous or other foreign matter from the bowel. The method employed in giving the injection, the temperature of the water, and the gentleness of the operation are exceedingly important, and will be discussed on the succeeding page. The amount of water employed in irrigation of the bowel in dysentery is not to be measured by quarts, but by results. It should continue to flow in until it comes from the outflow tube perfectly clear, showing that our object—namely, thorough cleansing of the bowel—has been accomplished. The best medicament to be added to the water is boric acid or tannic acid, each of which is harmless and capable of doing much good.

The question as to what is the best method of treating a case of intestinal obstruction by other than operative means is one which is of interest to the physician as well as the surgeon. Such cases generally come into the hands of the general practitioner first, and it is for him to decide, as a rule, whether the surgeon shall be called in consultation. Measures devoted to the relief of the patient without the use of the knife are first to be tried. No one who has studied this subject can doubt that enteroclysis is the best form of treatment which we can apply. Used properly, there is little danger of its doing harm, and much chance of its accomplishing good. The author is not one of those who place much confidence in the reports of cases of volvulus overcome by this means. The true indication for rectal injections is intussusception or obstruction due to impacted fæces.

A very important point to be decided in connection with this subject is the amount of pressure that can be used in the stream of water which is employed, the length of time during which the injection may be given, and, finally, the temperature and character of the fluid injected. As is well known, the great majority of cases of intussusception take place at the ileo-cæcal valve, and, if not here, in the sigmoid flexure. Pressure by injection is therefore readily brought to bear on the area involved. It has been claimed that certain pressures will cause rupture of the peritoneal coat of the intestine, but Martin and the writer failed to produce this lesion in the dog by any pressure we could employ, since before this occurred the liquid passed through the stomach and mouth. To employ a pressure exceeding eight pounds is, however, distinctly dangerous, not because the intestinal wall in health will not stand this, as a rule, but because it is near the injury line, and if any disease or softening of the bowel exist, it is almost certain to cause rupture. A pressure of from two to five pounds is, as a rule, as much as may be employed, and this pressure should be obtained by degrees, starting the injection at such a point of pressure that it amounts to hardly more than a trickle, and increasing the pressure as the antagonism of the bowel is overcome. Finally, when the bowel is fully distended up to the point of obstruction, the pressure on the no longer moving column of water may be increased, if necessary, to six or eight pounds by raising the bag of water not more than three feet. In infants, in whom invagination so often occurs, a pressure greater than two pounds is dangerous, and it is of vital importance that the pressure be employed properly, otherwise it will do more harm than good in several ways. As a rule, in our anxiety to give the patient relief at once we are inclined to use too much force and too large a bulk of water, and think that active force, if such a term may be used, is to be resorted to. Those who have seen these cases have learned by experience the harmfulness of such measures, and have also learned how great is the expulsive power of the bowel when it is excited to contraction. If this power be brought into activity, it will be almost impossible to inject fluid into the rectum, and, worse than all, the muscular fibres of the intussuscipiens take a still tighter grasp on the intussusceptum.

The dangerous practice of using a Davidson or any other kind of artificial-force syringe in the treatment of this class of cases is to be condemned. Three unreported cases of rupture of the bowel and death from the employment of the Davidson syringe for this purpose have occurred, because the amount of force used was indeterminable, and because it was injected with a jerking instead of a constant flow. The amount of fluid injected should be large, and if it is impossible to get a large amount into the bowel, it is probably because the inflow has been so rapid as to excite intestinal opposition. If, by a slow trickle of water into the bowel, gradually increasing the pressure, we are unable to give relief in forty-five minutes, it is necessary either to give this treatment up as useless, or else allow the liquid to flow away and resort to the measure again in some hours. Practical experience has shown that the second or third injection sometimes succeeds, probably because it is more skilfully given and the first has prepared the way for the others, but it is to be remembered that the chances for reduction of the obstruction are best with the first injection if it is properly given. Frequently-repeated small injections are absolutely unjustifiable.

Finally, the author cannot leave this subject without saying a word concerning the temperature of the injected liquid and its constitution. An injection of this kind goes into the very heat-citadels of the body, and if too cold, as it often is, produces dangerous chilling of organs which are ordinarily especially protected from cold by the omental apron and intestines. By repeated experiment we found that water at 65° F. lowered the bodily heat three degrees in thirty minutes. The use of colder water than this (52° F.) resulted in death in twelve hours, and the post-mortem showed intense congestion of the colon, which contained bloody mucus.

The use of water of too high a temperature is also dangerous, lest it produce heat-stroke. Of course no one would use water hot enough to produce local harm, yet it is necessary to have just enough heat and no more. Martin and the author proved that the use of water at 115° F. caused in twenty-five minutes a rise of bodily temperature in the axilla of nearly five degres, and developed marked symptoms of heat-dyspnœa. The temperature which it is right to employ we found to be 101° to 103° F. as the water entered the bowel, or even as high as 104° F. in the water-bag if a long tube was used, as under these circumstances the water is rapidly cooled. An interesting result of these experiments as to heat is that when cold water was used it took four times as long to make the injection as when moderately warm water was employed.

If very large injections are used, a normal saline solution of 7 : 1000 (1 drachm to 1 pint) should be employed to avoid the abstraction of vital salts from the intestinal wall, with consequent passage of water into the tissues, making them boggy, according to the law of osmosis. Such injections are very useful to relieve thirst and keep the kidneys active after abdominal operations.

In regard to the effect of distention of the bowel by injection on the circulation and respiration, there is practically none, but the passage of large amounts of warmed fluid directly into the closed abdominal cavity causes death rapidly.

HEAT.

Heat is used locally for a number of purposes in the same manner as is cold, and, as was stated in the article on Cold, the choice of heat or cold in the treatment of any acute form of inflammation depends almost entirely upon the wish of the patient, who generally can tell at once which will give him the greater comfort.

In sprains of the ankle nothing compares to a hot foot-bath prolonged for hours, the object being to decrease the pain and swelling, thereby regaining the use of the limb. To carry this out effectively, a piece of rubber tubing of small size should be led from a wooden bucket, which, being a bad conductor of heat, prevents the water from being rapidly chilled, to a sink or large tub near by, when by starting the water by suction a continuous but very small stream can be made to flow from the bucket, while by means of another similar arrangement running either from another tub—or, better still, from a hot-water spigot—a small stream of hot water continually enters to take the place of that withdrawn by the first siphon. Under these circumstances a very constant temperature of the water can readily be maintained. The high degree of heat which can be borne by gradually increasing the temperature of the water in the supply-tube is very extraordinary, the favorable results obtained being in direct ratio to the height of the temperature. Between these soakings the part should be dressed with lead-water and laudanum, and rubbed now and then with camphor liniment containing laudanum.

In spasmodic affections involving either striped or unstriped muscular fibre the local application of heat is a very useful means of relief. Sometimes in lumbago or muscular stiffness in other parts of the body the use of an ordinary laundry iron over the affected part will prove of great service, the skin being covered by several layers of newspaper to afford a smooth surface over which to pass the iron and to protect the parts from too great heat.

In chordee the best means for rapid relief, other than the use of drugs or general relaxants, such as amyl nitrate, is to steep the penis in hot water. A hot sitz-bath before going to bed is a good prophylactic against this painful complication of gonorrhœa.

In croup of the spasmodic type the local application of a hot compress, made by wetting spongiopiline with hot water, is very useful, or, if spongiopiline cannot be had, several layers of flannel should be wetted, placed on the neck, and covered with cotton and oil-silk so as to prevent the roll from becoming chilled.

Where attacks of dysmenorrhœa depend upon spasmodic closure of the cervix, with simultaneous spasm of the fundus uteri, a hot sitz-bath or vaginal injection is useful, and this treatment is also of value where uterine congestion results in leucorrhœa or a sensation of weight in the pelvis. Sometimes attacks of torticollis may be subdued by applying hot compresses to the sterno-mastoid muscle.

In universal or partial spasm of the body, as well as that represented by chorea, a hot pack is of great service, and it is to be used in the following manner: The child, having first been stripped of all clothing, is placed upon a bed which is covered by a rubber blanket, and immediately wrapped in a woollen blanket which has been dipped in hot water and the excess of water wrung out of it. Over this wet blanket is immediately wrapped a dry one, to retain the heat, and very soon the patient begins to perspire freely. Care should of course be taken that the temperature of the patient does not rise too high before sweating comes on. This hot pack will sometimes quiet a case of chorea which has resisted all forms of treatment so far as drugs are concerned. Cases of insomnia are often benefited by a similar expedient, and mild cases of sleeplessness will occasionally rest quietly after an ordinary hot bath.

A wet pack which speedily becomes a warm one is used in cases where, during the course of an eruptive fever, the eruption fades and it is desired to bring it out on the surface. It is also useful in those cases of severe chorea in which the child can stand the first shock of the cold. It consists in wrapping the child in a cold wet sheet and over this wrapping one or two blankets. In a few minutes the sheet becomes heated from the body, and the sweating which results is profuse.

Cold should be applied to the head to relieve cerebral hyperæmia and to prevent overheating during this treatment.

The use of heat in two forms has been and is largely used at present for medicinal purposes, when the skin or kidneys are torpid, to aid in the elimination of impure and effete materials from the blood and tissues. These two forms of heat, the dry and the moist, are commonly called the Turkish and Russian baths respectively, and may be taken under home arrangements or in one of the establishments found in all large cities.

The first of these is in the form of dry heat, the second is moist heat. The Turkish bath consists of a series of rooms ranging in temperature from 100° F. to 150° F. or more, into which the individual passes successively until the hottest room is reached. In each chamber he lingers until the system becomes accustomed to the high temperature, and perspiration is well established before he enters the hottest room, where he remains for a varying length of time according to the advice of his physician or his own whim or comfort. The rule governing his stay is that he must leave it at once if any sense of oppression is experienced or if perspiration does not flow freely. Sometimes a glass of cold water taken at this time causes a sudden profuse sweat, and also relieves any overheating by abstracting many units of heat. The cold water in the centre of the body causes contraction of the blood-vessels in these parts, and the blood, rushing to the surface, causes the sweat-glands to pour out their secretion.

Following the stay in the warm room, the individual passes into still another chamber, where he is shampooed from head to foot, well rubbed, and the blood made to circulate through the skin. The shower-bath is then used, at first hot or warm, and finally changed to a dash of cold, or, better still, the patient plunges into a long tank, swims to the other end, and is there met by an attendant who rapidly dries his skin, wraps a cover round him, and shows him to a lounge, where he is supposed to recline and sleep for an hour or less. The air of this sleeping-room is at the ordinary temperature of a living-room.

Reviewing for a moment the effects of this bath, we find that the first two-thirds are devoted to the opening and stimulation of the pores of the skin, while the last third is devoted to the contraction of these pores and their supplying blood-vessels. In other words, it is necessary to use the cold to prevent gradual chilling of limited areas, which would result in internal congestion. If the patient receives a cold douche, the natural rebound prevents congestion of a permanent nature, whereas if he is exposed to cold a long time, these stagnated areas become permanently diseased. The physician must always remember that this cold douche or plunge is a *sine quâ non*, and that a rest after the bath before dressing is almost equally important. If the patient is too weak to bear the cold, he must not use the bath.

The indication for the Turkish bath as a medicinal measure is any condition of the emunctories of the body whereby effete matters are not properly eliminated, as in Bright's disease in its various forms. The increased action of the skin not only casts off impurities for the time being, but frequent repetition of the bath causes functional hypertrophy of the sweat-glands, and eventually enables them to do more work, or, in other words, to cast off an increased quantity of effete material. As a consequence of this the patient is able to avoid uræmia or other evidences of Bright's disease, and, employing the normal epithelium still left in the kidney for constant use, uses the bath once, twice, or thrice a week with the object of abstracting the excess of impurities which the impaired kidneys cannot remove. The frequency of the bath depends, therefore, upon the rapidity with which the effete materials accumulate. In a case of Bright's disease the patient should not attempt to use the room containing high heat at first, and should be accompanied by a medical attendant to watch for untoward effects, particularly if the heart is diseased or uræmia is already shown by headache or other signs. If sweating does not come on at once, danger is at hand from acute uræmia, renal and cerebral congestion, or heat-stroke.

Not only is the Turkish bath useful for kidney disease, but it is often of great service in rheumatism. The acute form of rheumatism is rarely so treated, because cardiac complications often forbid exposure to heat, and fever is generally present. In subacute and chronic rheumatism the case is different, and the enlarged joints or inflamed muscles yield like magic in some instances to such treatment. Further than this, the muscular stiffness following prolonged or severe effort can be so avoided, and neuralgia depending upon rheumatic or gouty taint may be relieved by the hot-air bath.

Acute colds affecting the nasal cavities or other parts of the body, at an early formative stage, can often be aborted by a good Turkish bath, and when further developed are often greatly relieved by the same means. If, however, congestion of the lung, pneumonia, or chronic bronchitis, with emphysema or a dilated weak heart, are present, the bath may be dangerous. In acute pharyngitis, in which the pharynx feels like a raw surface or "as if it were filed or scraped," the bath will give relief in many instances.

Sometimes in suppression of menstruation from cold the flow may be restored by a Turkish bath.

Some persons complain that they are always catching cold upon the slightest provocation and apparently without cause. One class seem to have delicate mucous membranes readily susceptible to irritation and inflammation; the other have dilated or relaxed peripheral capillaries, which readily allow the blood in them to become chilled, and the individual consequently suffers from internal local congestions. Two separate means of treating such cases exist. The first set will do well on minute doses of arsenous acid (grain $\frac{1}{100}$ to $\frac{1}{50}$) three times a day, used for weeks; the second will be cured of their habit by the use of a Turkish bath twice or thrice a week, since by this means the peripheral capillaries are toned up and made more active.

The Turkish bath, as thoroughly carried out in large cities, is not obtainable for those living elsewhere, so it is well to describe a home modification which, with attention to detail and care, may prove almost, if not quite, as effective a remedy.

The patient is placed upon a chair, naked, and under the chair a small alcohol lamp is put, which is lighted. The individual is now wrapped thoroughly, chair and all, with one or two large blankets, and the heat of the lamp soon causes profuse sweating. Many cases are, however, on record where the lamp has been upset and the patient badly burned. The best way is to have the lamp a little to one side and its flame immediately under the mouth of an inverted funnel attached to a piece of tin tubing, the free end of which is placed under the blanket, so that the hot air and vapor may surround the body. If the tube be covered with cloth, the loss of heat is slight and the danger of burning the patient is removed. If this is not practicable, several very hot bricks or stones, thoroughly heated in an oven, may be placed under the chair, or small heated logs may be substituted. When the patient is too feeble to leave the bed, then it is wise to place an alcohol lamp at the foot of the couch, with an inverted funnel attached to a tube which passes under the bed-clothes in such a way as not to bring the hot air directly against the skin of the patient. The bed-clothing may be slightly raised to allow the hot air to enter. This is a valuable mode of using external heat in cases of shock. The vapor of the alcohol lamp tends to sweat the patient.

The Russian bath differs from the Turkish in that the heat used is moist, not dry. As a consequence the danger of heat-stroke and similar states is much increased, because evaporation from the skin does not go on so rapidly and the body is not cooled so well in consequence. In its place the patient may be given a warm pack, which consists in wrapping him in a sheet and surrounding him with large blankets wrung out of water as hot as can be borne, which are in turn covered with a dry blanket to prevent cooling. (See page 386.)

This method of treatment is useful in the same states as is the Turkish bath, but is more rarely used. The warm pack just named is also employed to develop the rash of any of the exanthematous fevers when it is suppressed by cold or is not "well out" on the skin. The temperature of the patient must be watched, lest he fails to have sweating and develops heat-stroke in consequence. A thermometer should be kept constantly under the tongue during the use of the pack.

The hot moist bath can also be obtained by placing a patient on a wicker chair under which is placed a bucket of hot water. The patient is surrounded by a blanket, and a hot iron or stone is put into the water, causing the development of a great amount of steam.

A valuable method for using moist heat in a mild form is the "bronchitis tent." (See article on Bronchitis.)

Whenever the Russian bath is used, except in the exanthematous fevers, it should be followed by a cold douche.

Although these baths have been used in the treatment of cases of heart disease to relieve dropsy and renal engorgement, they are not safe and should not be generally employed. All acute or chronic diseases of the lung, except acute bronchitis of a mild form, contraindicate their use.

Kalashnikoff has made a series of observations on the therapeutic effects of heat on syphilis, and especially on syphilitic eruptions, his patients being inmates of the St. Petersburg Lock Hospital for Women and Children. The heat was applied, where possible, by means of partial hot-air baths to the affected part for half an hour twice a day, the diseased area being enveloped in hot flannel immediately afterward, and remaining so protected until the next hot-air bath. The temperature never exceeded 116° F. (46.6° C.). When the eruption was on the back or neck or on some part which could not be inserted in a hot-air chamber, India-rubber hot-water bottles or tubes, through which hot water was kept flowing, were employed. When both arms or legs were affected in a symmetrical manner, the treatment was confined to one side, the other being left untreated for the purpose of comparison. The results showed that the heat treatment acted very energetically and beneficially on syphilides, both when employed alone instead of mercurials and iodides, and also when used in conjunction with these remedies. Often heat proved beneficial when the ordinary specifics had failed. Among other observations it was noted that hard chancres healed and the induration disappeared in from eight to sixteen days; roseola and papular erythema disappeared in from four to eight days; various forms of papular and impetiginous syphilides, with marked pigmentation, disappeared in from eight to twenty-one days; non-ulcerated tubercles and gummata disappeared in from seven to twenty-four days, but those which had already begun to ulcerate required from one to six weeks; periostitis was cured in from ten to twenty-four days; ostoses were not affected; syphilitic ulcers, consequent on the breaking down of gummatous periostitis, required treatment of from six weeks to three months or more, while necrosis of bone frequently required many months' treatment before the sequestra could be got away.

HYPODERMOCLYSIS.

Hypodermoclysis is a method of supplying fluid to the body to replace that lost through excessive purging as in cholera, or in cases of hemorrhage. Further, it may be used to wash from the body various impurities circulating in the blood or other liquids and to flush out the kidneys. It consists in the introduction into the subcutaneous tissues of normal saline solution, which is rapidly absorbed by the vessels. As is well known, a quantity of liquid equal to four times that of the normal amount may be passed directly into the veins without producing a rise of blood-pressure, and experiment has shown that within fifteen minutes after the fluid flows into the subcutaneous tissues an increased flow from the kidneys takes place. It is not safe to infuse a greater quantity of liquid than 1 drachm to each pound of body-weight in each fifteen minutes, as, if this amount is exceeded, the accumulation of the liquid in the system is so great that the tissues become bathed and finally drowned, because the kidneys cannot excrete the liquid fast enough. In the best article on this subject yet published in this country, Hildebrand of San Francisco carefully indicates the limits to which the method may be carried, and shows that if the proportions already named be preserved, the operation of hypodermoclysis of normal saline solution may be prolonged indefinitely, and that as the process goes on the urine becomes paler and is lowered in specific gravity until it is practically identical with the inflowing stream. To carry out the operation the sterilized liquid to be infused—namely, 7 parts of sodium chloride to 1000 parts of water (3½ grains to the ounce)—is placed in a glass jar which is absolutely aseptic, and to which the air only gains access by means of a glass tube filled with sterilized cotton. From the lower part of the vessel leads a tube to which is attached a trocar also rendered absolutely sterile. The skin over the place where the liquid is to enter is to be rendered absolutely sterile, and the trocar is then inserted into the subcutaneous tissues of the thighs, or, preferably, of the abdomen, and the liquid allowed to flow at the rate named, the pressure being obtained by raising the container two or three feet above the belly-wall. As the liquid enters a swelling appears in the subcutaneous tissues, which soon disappears after the infusion ceases, and is much aided in its absorption by the use of massage.

When hypodermoclysis is employed after hemorrhage the results are often extraordinary, and Cantani, who has used the method to overcome the drying of the tissues in cholera, praises it most highly, as does also his critic, Oser. The cyanosis decreases rapidly, the pulse improves wonderfully, and the respirations are no longer difficult. Sahli of Berne has used hypodermoclysis with very good results in the treatment of uræmia, and he thinks that not only are the poisons washed out of the system by this method, but in addition that the dilution of the poisons prevents them from acting so forcibly. In septicæmia, diabetic coma, and similar states this method of treatment should be employed and results carefully recorded and reported.

In cases of surgical shock warm saline fluid used by hypodermoclysis is often of great service. (See also Intravenous Injection; Transfusion).

INTRAVENOUS INJECTION.

The intravenous injection of medicines is a method which is to be employed only under extraordinary circumstances and with only a few drugs. Thus in the case of snake-bite it may be advisable to resort to such an injection of diluted aqua ammonia or ether, or even warm brandy or whiskey. Under these circumstances the injection should be made into a vein in the leg, rather than one in the arm, as the drug under these circumstances does not reach the heart in so concentrated a form and temporary cardiac depression is thereby avoided.

The objections to intravenous injections are several. In the first place, the veins are apt to be collapsed and hard to find, and it is difficult to puncture one without wounding the opposite wall of the vessel. Again, phlebitis is a very probable sequel, and thrombosis and embolism are by no means impossible.

It is needless to say that the solution of the drug which is injected into a vein should always be of a neutral or alkaline reaction in order to avoid coagulation of the blood. (See Transfusion.)

KATAPHORESIS.

By the term "kataphoresis" we mean a method resorted to by physicians having for its purpose the introduction into the body of drugs through the influence of electricity. Correctly speaking, kataphoresis is an osmosis of medicaments through the tissues, the osmosis being carried on by the galvanic current and the drug being carried through the tissues between the two poles. Quinine, iodide of potassium, the various soluble salts of mercury, and chloroform and ether may be so used. The ordinary sponges or absorbent cotton tips of the electrodes may be saturated with the medicament to be used, and the constant current employed, the current being reversed every few minutes. The positive pole of the battery is placed over the affected part, and the negative at a little distance away.

In cases of neuralgia, chloroform and alcohol, of each one-half, or even pure chloroform, may be employed, and in syphilitic nodules, when the patient's stomach cannot bear drugs, kataphoresis with iodides over the part affected may be resorted to. The iodide of lithium is commonly employed in the strength of 5 per cent. in these cases. The strength of the current depends upon the size of the electrodes and the sensations of the patient. It is not necessary to use a stronger current than the patient can bear with comfort.

LAVAGE.

This is a term applied to washing out of the stomach in cases of gastric dilatation, fermentative dyspepsia, and more rarely in cases of gastric carcinoma. It is particularly valuable in the two first-named conditions, not merely for its curative power, but also to rid the stomach of mucus and render it clean before fresh food is placed in it.

Originally proposed by Epotius in 1863, it has been most widely employed in children by Epstein, who in one article alone records its employment in 286 cases of gastric disease in infancy, the patients being less than one year of age.

Epstein employs a No. 8 or a No. 10 Nélaton catheter for the tube, and warm water holding in solution a little benzoate of magnesium or boric acid, the latter being resorted to chiefly when fermentation- and decomposition-products are present. If none of these conditions are present, ordinary water will usually suffice. The liquid employed should always be warmed. Others—as, for example, Lorez—use the ordinary catheter, of the size known as No. 13 or No. 15, in children, but for an adult a tube should be used of at least four and a half to five feet, of which eighteen inches pass into the mouth, the remaining portion reaching to the basin when lowered to allow siphonage. The question as to the variety of tube to be employed is a vital one, since a poorly-devised apparatus not only gives no relief, but disgusts both the patient and the physician with the technique of the method. The tube should be more like a hollow bougie than a catheter, in order that its calibre may be great enough to carry off some of the semi-solid materials present. If this rule is not carried out, two evil results follow: In the first place, the tube and its apertures rapidly, or even at once, become clogged; secondly, the liquid is drained away, leaving behind a mass which is semi-solid, to be sure, and less bulky, but which is nevertheless the quintessence of the nastiness of fermentation, and quite as qualified to leaven any fresh food on its entrance as the liquid would be.

The holes in the gastric end of the tube should therefore be of sufficient size to take in fairly large masses. In some cases the ordinary siphon may be used, but where there is any solid food or resistance suction by means of a stomach-pump is necessary.

The best tube is No. 10, made of red Para rubber with a closed end and lateral holes.

The methods by which lavage is employed, further than those we have named, are as follows: The tube should be passed backward against the roof of the mouth, so that by following the curve of the hard and soft palates it is directed into the pharynx and œsophagus, and then by gentle pressure forced on down into the stomach. At the same time the patient should be directed to swallow. The mucus in the throat sufficiently lubricates the tube, and oil is to be avoided. If gagging is excessive, the pharynx may be first painted with cocaine. The irritability of the pharynx usually rapidly disappears, and it is surprising how quickly the patient may become accustomed to the operation, and submit to it without any feeling of discomfort. After the tube has reached the stomach a small funnel is to be fitted in its external end, which is then held above the head of the patient while water prepared in the way we have mentioned is poured into it until the stomach is filled, when the funnel end is lowered and the stomach is emptied by siphonage.

The stomach-pump has one very serious disadvantage, which is present with even more force in the case of a child than in an adult—namely, the danger of injury to the coats of the organ. This apparatus is also more costly and cumbersome, and for children the siphon is powerful enough in its action to take away all excuse for the use of the more complicated apparatus unless the contents of the stomach are in bulk.

It is particularly necessary in children, if a catheter is used and on account of the lack of intelligent aid and their liability to gulp, that every care should be taken that the tube does not slip entirely out of reach into the stomach; and for the prevention of this danger a string should be attached to the external end of the catheter before it is introduced, and the tube should always be at least thirty inches in length.

LEECHING.

Leeching is a method of abstracting blood for the purpose of relieving local inflammations or acute congestions. There are two forms of leech commonly employed in medicine, both of which are imported. A small leech is found in many streams in the United States. Leeches, after attaching themselves to the skin by means of their sucking apparatus and teeth, secrete a liquid which prevents coagulation of blood, and this accounts for the persistent hemorrhage sometimes seen after a leech-bite.

Therapeutics.—The reasons for using venesection or depletion have already been considered, and we can therefore pass directly to the uses to which leeches are put. In cases of meningitis they may be applied to the temples or to the nape of the neck, and in the treatment of swollen joints, such as occur after sprains, they are useful. In orchitis they should not be placed upon the scrotum, but on the perineum. In conjunctivitis or inflammation of the eye they should be applied upon the temple or back of the ears, not upon the lid itself.

Employment.—Leeches if singly applied may be placed on the skin under an inverted wineglass or under a large pill-box. If they will not take hold, a little sweetened milk may be placed on the skin or a drop of blood extracted from the finger may be placed there. In all cases the skin should be carefully washed before the leech is used. When the leech has taken enough blood, it can be made to let go its hold by sprinkling it with salt. Each leech will take about 1 drachm of blood. Leech-bites should be watched lest prolonged consecutive bleeding exhaust the patient. In case of such an accident styptics are to be employed. As leech-bites make permanent scars, the animal should not be applied on the face or other exposed surface of the skin.

REST CURE.

The rest cure, so called, is a method devised and elaborated by Dr. S. Weir Mitchell of Philadelphia for the relief of a large class of patients who, for various reasons, are generally ailing from apparently no organic disease, and yet whose condition is often so alarming as to lead to the belief that some hidden cause of a severe train of symptoms must be present. In many such instances a careful study of the case will show that there is a cause, near or remote, which has exhausted the patient's vital forces without producing anything else than functional disturbances of the body. Thus a prolonged nerve-strain in nursing a sick relative may so exhaust the strength of a hitherto healthy woman as to produce hysteria, anæmia, and great disturbances of nutrition, or, in another instance, cause neuralgia, disordered menstruation, and uterine or ovarian pain. In males mental, sexual, or physical vigor may be impaired, owing to prolonged anxiety in business. Be the symptoms what they may, as long as they are dependent upon nerve-strain this "cure" is to be resorted to, and if properly carried out is often blessed with surprising results. Before describing the method in detail it is proper to state that its entire *rationale* rests upon the remembrance that every movement is an expenditure of force, and that a system which has already overdrawn its reserve fund of strength must be as careful with its funds that remain as a bank should be under the same circumstances.

It having been decided that the rest cure is to be employed, the directions are given as follows:

A bright, airy, easily-cleaned, and comfortable room is to be selected, and adjoining it, if possible, should be a smaller one for an attendant or nurse. The patient is put to bed and kept there for from three to six weeks, as may be necessary, and during this time is allowed to see no one except the nurse and the doctor, since the presence of friends requires conversation and mental effort. The patient, in severe cases, must be fed by the nurse, in order to avoid the expenditure of the force required in the movements of the arms. No sitting up in bed is allowed, and if any reading is done it must be done by the nurse, who can read aloud for an hour a day.

In the case of women the hair should be dressed by the nurse to avoid any physical effort on the part of the patient.

To take the place of ordinary exercise two measures are employed, the first of which is massage or rubbing of the body, the second electricity. By the kneading and rubbing of the muscles and skin the liquids in the tissues are absorbed and poured into the lymph-spaces and a healthy blush is brought to the skin. This passive exercise is performed in the morning or afternoon, and should last for from a half to one hour, every part of the body being kneaded, even to the face and scalp. In the afternoon or morning the various muscles should be passively exercised by electricity, each muscle being made to contract by the application of the poles of the battery to its motor points. Both these forms of exercise do not call for any expenditure of nerve-force, though they keep up the general nutrition. The following programme for a day's existence is an example of what the physician should order:

7.30 A. M. Glass of hot or cold milk, predigested, boiled, or raw as the case requires.

8 A. M. The nurse is to sponge the patient with tepid water or with cold and hot water alternately, to stimulate the skin and circulation, the body being well wrapped in a blanket, except the leg or portion which is being bathed. After this the nurse should dry the part last wetted with a rough towel, using some friction to stimulate the skin.

8.30 A. M. Breakfast. Boiled, poached, or scrambled eggs, milk toast, water toast, or a finely-cut piece of a mutton-chop or chicken.

10 A. M. Massage.

11 A. M. A glass of milk, or a milk-punch, or egg-nog.

12 M. Reading for an hour.

1 P. M. Dinner. Small piece of steak, rare roast beef, consommé soup, mutton broth, and any one of the easily-digested vegetables well cooked.

3 P. M. Electricity.

4.30 P. M. A glass of milk, or milk-punch, or egg-nog.

6.30 P. M. Supper. This should be very plain, no tea or coffee, but toast and butter, milk, curds and whey, or a plain custard.

9.30 P. M. A glass of milk or milk-punch.

In this way the day is well filled, and the time does not drag so heavily as would be thought. If the stomach rebels at over-feeding, the amounts of food must be cut down, but when all the effort of the body is concentrated on respiration, circulation, and digestion a large amount of nourishment can be assimilated by the exhausted body, which before this treatment is undertaken may have had its resources so scattered as to be unable to carry out any physiological act perfectly.

For the treatment to be successful the rules laid down should be rigidly followed and never remitted for a single hour.

MINERAL SPRINGS AND CLIMATE.

This article is intended to give the practitioner and student a general idea of where to send patients who can afford to resort to treatment depending upon watering-places and climates. It is manifestly impossible to include the names of all the health-resorts, and the object has been to indicate the diseases which are benefited by these treatments, taking certain well-known resorts as types of each class.

Springs.

Medicinal springs are usually resorted to for the double purpose of drinking and bathing in the waters, although in many instances one of these methods so far exceeds the other in popularity that it alone is employed.

For general purposes we may divide these medicinal or beneficial waters into four classes—namely, those which act, first, by their purity chiefly; second, by the presence of more or less active alkaline ingredients; third, by the heat which the waters contain as they leave the earth; and, fourth, by reason of the sulphur and iron which they contain. The first class—namely, those which act by reason of their purity—are indicated chiefly in cases where through high living or other cause the system becomes laden with impurities through imperfect elimination of tissue-waste. Most of the popular lithia waters depend chiefly upon this ability to dissolve effete materials, and very little upon the lithia, which is often present in very small amount. (See Lithium.) Aside from their purity, they also act by reason of the salts of sodium and calcium which they contain. Good results follow their use in the uric-acid diathesis where the urine is scanty, high-colored, and acid. They do good in cases of irritable bladder by washing out this viscus with mild urine in large quantities, and because of this influence are credited with wonderful cures of vesical calculus. When vesical calculi have broken down while these waters were being taken, the fortunate result has been coincidence rather than medicinal interference. It is impossible for them to dissolve stones, but their constant use may prevent the formation of new ones. Perhaps the best representative of such waters is Londonderry lithia water.

A subdivision of this class consists of those waters which contain somewhat larger amounts of mineral substances, chiefly potassium, sodium, and calcium salts. Because of the power possessed by alkaline salts in aiding in oxidation, these waters are used in cases where the effete matters of the body seem to escape only partly oxidized, and where the kidneys, and perhaps the liver, seem torpid. Such springs are the Kissingen and Vichy at Saratoga. If very mild purgative properties are also desired, the Geyser Spring at Saratoga may be used. In

Europe the most famous springs of this class are at Vichy (Grande Grille), Vals, and Contrexeville in France, and Kissingen in Bavaria.

The second class of springs are those which contain salts of sodium, calcium, potassium, and magnesium in sufficient amount to possess very active diuretic and purgative properties. They find their therapeutic application in cases of hepatic torpor or congestion associated with gouty or rheumatic tendencies, particularly in those individuals who have been high livers, who lay on too much fat, so clogging their organs, and, finally, in those who through illness or exposure to hot climates have subacute or chronic atony of the liver, of the organs of digestion, and of the lymphatics. Nearly always these patients also suffer from more or less constipation and gastro-intestinal catarrh, and are often obese. The sulphate of sodium is an ingredient of many purgative mineral waters, and the activity of a water depends very often on the percentage of this salt which is present. The purgative action of a water also depends upon the time at which it is taken. When taken on an empty stomach it is of course more active. When taken early in the morning before eating and at the natural temperature such a water produces a loose watery movement, not only unloading the bowel of fæcal matter, but by its alkalinity loosening catarrhal secretions and unloading the liver of congestion. The quantity to be taken in twenty-four hours varies from 1 to 4 pints, but this question can only be decided by the local physician, who studies the effect of the water on the patient. The best-known waters of this class are the Champion, Congress, Hathorn, and Carlsbad Springs at Saratoga, New York, the Crab Orchard in Kentucky, and the springs of Carlsbad and Marienbad in Bohemia, and Friederichshall in Germany.

The hot springs depend chiefly on their heat, as already stated, and differ in chemical composition. They find their value in the treatment of chronic skin diseases, specific or otherwise, and also are useful in aiding in the treatment of rheumatism, gout, and syphilis. Their good results are produced by their heat, which varies from 93° F. to 150° F., and the advantages always derived from properly employed hydrotherapeutic measures. It is in chronic or subacute cases that they do the most good. Hot baths are also of great value in the treatment of chancroid and malignant syphilis. The results achieved depend upon the increased activity of the skin, the improvement of the peripheral circulation, and the increased powers of absorption produced through increased cellular activity.

Patients should always select a competent local physician at such places.

In cases of syphilis the methods of treatment to be followed are as follows: The patient should take the bath at a temperature of 90° F., and remain in it for about twenty minutes. After this he is rapidly but thoroughly dried by an attendant, who at once proceeds to rub into the skin of one thigh an amount of mercurial ointment varying from a few grains to a drachm. This is well rubbed into, not smeared over, the skin of a different limb after each bath. The number of baths and inunctions depends upon the condition and necessities of the case, care being exercised not to push the mercury too freely in those who are very susceptible to its use. These baths also aid in the absorption of mercury when it is administered by means of fumigation.

The most celebrated of these springs are the Hot Springs of Arkansas and those found at Aix-la-Chapelle in Germany.

As types of the fourth class of springs we have the White Sulphur Springs in West Virginia and the Richfield Springs in New York, which are used for the relief of catarrhal inflammations of the mucous membranes of the alimentary canal and respiratory passages, and more rarely for catarrhal states of the genito-urinary tract. Not only do they exert the peculiar remedial powers long known to belong to sulphur and its compounds by reason of the sulphuretted hydrogen gas contained in them, but they also possess distinct purgative effects. Their chief mineral constituents consist of sulphate of sodium and magnesium, which unload the bowels and portal system in the same manner as do the Champion, Congress, Hathorn, and Carlsbad Springs at Saratoga and those at Crab Orchard. Taking the White Sulphur as a type of its class, it is better than the Saratoga springs in catarrhal states for the reasons given.

Rockbridge Alum Spring in Virginia is used in cases of chronic diarrhœa with very useful results in many cases. It is not so useful in acute inflammations of the intestine as in the diarrhœa due to chronic disorder. As iron is present in it and in most alum springs in considerable amount, this water is useful in anæmic cases, but is contraindicated by fevers, by chronic congestions, chiefly of the liver, and by plethora. Often in place of alum we find salines associated with the iron, and these waters are particularly indicated in the catarrhs associated with anæmia. Such a spring exists at Bedford, Pennsylvania. In Europe the chief iron springs are at St. Moritz in Switzerland and Tunbridge Wells in England. Neither of these contains much sulphur or alum.

Climates.

The practitioner is most frequently consulted as to the possible benefit of climatic changes by persons suffering from pulmonary disease, such as tuberculosis of the lungs, asthma, chronic bronchitis, and emphysema—more rarely by those convalescing from pneumonia or other severe acute illness.

The general rules to be followed in all cases are—first, choose a climate having as large a number of clear days as possible, in order that an out-of-door life in the sunshine may be had in plenty; second, the nearest place to the home which is available in order to avoid fatigue, expense, and home-sickness; and third, see that the resort chosen has comfortable accommodations, good drug-supplies, and a capable physician to be called in case of need. In a case of tuberculosis and in all patients suffering from the pulmonary complaints named above the following rules may be adhered to, except in persons suffering from attacks of acute bronchitis, who always need a climate providing moisture and warmth. Some tubercular patients do best in a high, dry air, and others in a lower and more moist temperature—the first being represented by that of Colorado Springs (6000 feet) in America and by San Moritz (6000 feet) and Davos Platz (5000 feet) in Switzerland, where the altitude is not only very great, but the air very cold in winter. The days in these places are many of them clear, but apt to be windy. Feeble persons cannot stand high winds, as a rule. The second climate is represented by that of Florida.

In many cases, however, some more moderate climate is useful, and this can be obtained in Lower California, as at San Diego, a place where there is virtually perpetual summer, or at Asheville, N. C. (2200 feet), or Thomasville, Georgia (330 feet), where the air is moderately dry and the climate not subject to sudden changes of temperature or to frequent storms. In other words, a spot is desirable where a patient can remain the year round, and, if well enough, engage in business, avoiding the cold, sharp March winds of the Middle, Eastern, or North-western States, and the necessity of leaving Florida on the advent of summer.

Physicians have attempted for years to formulate rules for phthisical patients as to the climate to be sought. In very many cases the various health-resorts have to be chosen by experiment, not by judgment beforehand. In cases of phthisis with profuse bronchial secretion a high, dry climate is generally the better, but in cases which suffer from dryness of the air-passages a sea-voyage or a warm moist climate is better, on general principles. It is probably true, however, that high altitudes and rarefied air are not to be sought where a distinct tendency to hemorrhage is present, unless the ascent or removal to the rarefied air is very gradual, several weeks being passed before the lung is exposed to the low pressure of great heights. The cases in which high altitudes do good are those which have poor thoracic development or chronic pleurisy with deficient expansion of the lung after tapping. The following excellent advice. given by White in his *General Therapeutics*, is worthy of repetition:

"It is of such importance that only suitable cases should be sent to high altitudes that we must point out those that are unsuitable:

"1. Those in whom there is considerable affection of the bronchial tubes, for the dryness of the climate increases the kind of bronchitis which commonly accompanies phthisis.

"2. Patients with much emphysema or bronchiectasis, because of the probably diminished absorption of oxygen and the difficulty of respiration experienced on first arriving.

"3. Patients with disease of the heart must not go to a high altitude, because of its effect upon the pulse and upon respiration.

"4. Cases liable to acute febrile attacks, whether or not these indicate an occasional increase of mischief in the lungs, should remain on a low level.

"5. Patients who are very excitable or suffer from insomnia should not go, for a visit to a place at a great elevation promotes these symptoms. Women do not acclimatize so well as men.

[illegible] be [illegible]

[illegible] rule: [illegible] advanced [illegible] make a [illegible] exhaust his strength [illegible] his happiness [illegible] when it is impossible [illegible]. A patient [illegible] on one occasion [illegible] a few days at [illegible] for consumptives, and when reprimanded for [illegible] replied: "Doctor, I would rather be at home, and [illegible] out a few more years surrounded by a crowd [illegible] and wasting consumptives." This reply evi- [illegible] necessity of avoiding "consumptive resorts" as [illegible] these cases, and in directing the mind of the [illegible] thoughts and his own ailment.

[illegible] renal and cardiac disease high altitudes are [illegible]. The chief desideratum is out-of-door life, with avoidance of chilling of the skin by sudden changes in temperature or strong winds. San Diego represents the necessary climate in such cases.

There is a class of persons who often have no actual disease of a chronic type, who nevertheless pass healthier lives if away from rigorous climates for at least part of the year. Without having acquired tuberculosis, their lungs are delicate naturally or because of attacks of disease, or, again, they become asthmatic or rheumatic in cold weather. In this country Asheville, N. C., and Thomasville, Ga., or San Diego or Coronado Beach, California, afford the climate desired, while in Europe patients are sent to what is known as the "Riviera," which is the district bordering on the Mediterranean Sea from Genoa to Nice and which is dotted with climatic resorts. This district has often as many as two hundred clear days between October 1st and May 1st. In the French Riviera the resorts are Cannes, Nice, Monaco, Monte Carlo, and Mentone; in the Italian Riviera, Bordighera and San Remo. In Naples and Spezzia the climate is more damp and colder, but nevertheless quite sunny. So much depends upon the location of the hotels in these places, as far as their salubrity in relation to air and dampness is concerned, that the patient should always consult a local physician before settling down permanently at any of these resorts.

SUSPENSION.

The treatment of locomotor ataxia and allied affections by means of suspending the patient has, during the last few years, been found so valuable for the relief of symptoms as to have taken a permanent place in therapeutics. The method is not confined to cases depending upon diseases of the vertebræ producing lesions in the spinal cord, but is equally useful in instances where the lesion is primarily situated in the nervous centres. The pain, nervous shootings, and tinglings, as well as the muscular contractions, which often trouble the patient very greatly, are all relieved, and in some cases walking is possible where, before the treatment, crutches were entirely relied upon. The knee-jerk, when absent or excessive, tends to return to the normal state, and the bladder and rectum become more regular in their functions.

The patient should use one of the apparatuses made by most large surgical-instrument makers, which consists in a cushioned head-strap and a cushioned leather loop for each axilla. The traction on the head should not be sufficient to cause discomfort; in other words, the weight of the patient should be equally distributed between the shoulders and the head. A rope is run from the harness to a pulley in the ceiling, and by this means the patient may be slightly raised from his chair—say two inches—once a day, for thirty seconds at first, which may gradually be increased to ten minutes. The swinging should be resorted to at first every second or third, and finally every, day. If several pulleys are put in the circuit of rope, the patient can soon learn to lift himself, making the rope fast to a cleat in a heavy chair or table, or even holding it in the hands. It is important that the patient after each swinging should rest for thirty minutes to an hour, and when let down to his chair the movement should be most gentle and not jerking or sudden. The same rule as to gentleness applies to the raising of the patient.

TRANSFUSION.

The term Transfusion was originally applied in medicine to the transference of blood from a healthy person (the donor) to the sick patient (the receiver), who was usually suffering from the results of profuse hemorrhage. When direct transfusion was not resorted to the blood was defibrinated after being drawn from the arm of the donor and the serum injected into the vein of the sick man. Both of these plans are now practically obsolete, for it has been proved that the blood-corpuscles of the donor always die in the vessels of the receiver and the kidneys are overwhelmed by an effort to eliminate the results of their destruction. Further, it is almost impossible to perform transfusion of pure or defibrinated blood without producing clots which will form emboli in the vessels of the patient. Finally, we now know that the blood-serum of one man differs greatly from that of another in its physiological effects and is not to be regarded as identical with the serum that is lacking in the patient. The use of milk as a transfusion fluid has been found to result in albuminuria, in infections of various kinds, and in the development of emboli. It ought never to be used for this purpose.

At the present time the profession employ a saline solution, injected gently into a vein of the arm or leg, not only to overcome the collapse of hemorrhage, but—far more important—for the relief of various forms of toxæmia. Commonly in hemorrhage and in toxæmia hypodermoclysis is used, as already described, because the danger of embolism and the possible results of opening a vein are not to be disregarded. Therefore, while hypodermoclysis is the safest and preferable method ordinarily, on the other hand when the case is very urgent, or the tissues are œdematous from dropsy, or the circulation is so feeble that absorption is impossible, then the intra- or endo-venous injection is to be employed without hesitation.

Various formula exist for the preparation of the so-called normal saline solution. Some persons are satisfied to employ the ordinary solution of common salt in the strength of $\frac{7}{10}$ of 1 per cent. ($1\frac{1}{2}$ drachms to the quart), in distilled and sterilized water. Others prefer to use a formula suggested by the well-known French clinician Prof. Hayem, as follows:

Sodium sulphate	10.0
Sodium chloride	5.0
Distilled water	1000 c.cm.

A still better solution, however—because it at once supplants the blood which has been lost or is impure, and because it supports the heart, is—

Calcium chloride	0.15
Potassium chloride	0.05
Sodium chloride	3.75
Sterilized water	500 c.cm.

The method of injection is as follows: The thoroughly sterilized saline solution, after being warmed to the temperature of 101° F., is placed in a warm glass irrigation-flask. The patient's skin over the elbow is bared and sterilized; the skin over one of the veins, which is made prominent by a bandage about the upper arm, is incised by a scalpel, and the sheath of the vein raised by means of a pair of dissecting forceps. This sheath is thoroughly dissected off the vein until this vessel lies free of any attachments for the space of half an inch. A small and gentle bull-dog clip is applied on the vein at the proximal end of the incision so as to keep the lower part of the vein full of blood. A ligature is now passed around the vein at the distal end of the incision and tied. Another ligature is then passed under the vein and left untied. The distended area of the vein, between the ligature which has been tied and the clip, is now snipped by means of a pair of fine scissors; and a glass canula, previously dipped in the saline solution to prevent the few drops of blood from coagulating on its tip, is inserted into the opening in the vein. The loose ligature is now tied around it and the vein, to hold the canula in place. This canula should have a shoulder at its tip to prevent the ligature from slipping off, and its other end should be attached to a piece of sterile rubber tubing not more than four inches long. By means of a sterilized glass pipette some of the saline is now run into the rubber and glass canula until all air is displaced and they are filled to the utmost. The saline is then allowed to flow out of the tubing attached to the irrigator, which is armed by a glass tip, till all the air is displaced, when one tube is slipped inside the other. By this means all danger of air-embolism is excluded. The irrigator is now held about two feet above the arm and the fluid allowed to slowly enter the vein, a half hour being spent in injecting about a quart. As the injection is given the pulse begins to improve, the respirations are deeper and less hurried and if fever is present the temperature usually falls. The patient is evidently better but soon enters the critical stage, which may come on in from two to thirty minutes. There is often a violent chill, a strong rapid pulse, and in the course of three-quarters of an hour a flushing of the skin followed by a profuse sweat. The respiration may be labored. The kidneys also increase the urinary flow and sometimes water escapes from the bowel. Several hours later the real benefit appears in convalescence or marked improvement.

The conditions in which the intravenous injections are to be performed are *severe hemorrhage*, *toxæmia* arising from the various forms of infection as in *septicæmia*, *uræmia*, and the *comatose* state in *diabetes mellitus*. They can be employed in threatened *eclampsia*, and even in the *toxæmias* of the *infectious fevers*.

The author has used them in uræmic and septic intoxication with the best results. The principle of this treatment is that it causes the rapid elimination of impurities from the body.

This method is to be regarded as a fairly promising method of treatment for cases otherwise doomed to death, and will afford permanent or temporary relief according to the severity of the underlying disease. When diabetes exists or Bright's disease is present the benefit is often only temporary. The European clinicians are loud in their praises of the results they have obtained by this plan in the various forms of sepsis.

Abdominal transfusion of both saline solutions and milk have been successfully carried out, the reason being that the peritoneal cavity is a vast absorbent surface which rapidly takes up liquids if the systemic vessels are not as full as they normally should be. The method consists in puncturing the abdominal wall as if for aspiration for dropsy. The tube from a hydrostatic syringe is now attached to the canula, and the liquid, having been warmed, is allowed to slowly flow into the belly. This method is not to be relied on where death seems very imminent, as it is not rapid enough in its effects.

VENESECTION.

Bleeding, or Phlebotomy, is so rarely practised to-day that very many of the profession have never abstracted blood for therapeutic purposes or have even seen it done by some one else. Furthermore, it is to be feared that many of the younger physicians would hardly know how to bleed if called upon to do so at a crisis. All this is wrong, for bleeding is a measure undoubtedly of the greatest value and one which every one may be called upon to resort to. Like many therapeutic measures, it was sadly abused in the early part of this century, and people were bled when taken ill with the same regularity that they were put to bed.

The indications for venesection are as clear and well defined as are the indications for any remedy. Briefly stated, we may say that all states of the circulatory apparatus denoting high arterial tension and excitement are indications, and that weakness, low arterial tension, and systemic or circulatory depression are contraindications. Since the use of veratrum viride has become more common, the conditions indicating venesection have been lost sight of, because this drug so dilates the blood-paths that a man is bled into his own blood-vessels.

Having made clear the general indications for the use of venesection, we may pass on to state some of the diseases in which it may be well resorted to. Of these, pneumonia, pleurisy, meningitis, and peritonitis, if they are sthenic, are typical examples, since all of them are accompanied by arterial excitement and characterized by local congestions affecting the lung, pleura, cerebral membranes, or peritoneum. (See Pneumonia.) By the abstraction of blood the vascular tension is lowered and the engorged area relieved. In the first place, the congested area is made up of relaxed blood-vessels, whereas the remaining blood-vessels of the body are tense, and, as a consequence, the blood is urged to the spot already engorged. In the second place, the abstraction of blood from the tense blood-vessels renders the general pressure lower than that in the diseased area, and the congestion is relieved.

In apoplexy the extravasation of blood into the brain causes great arterial excitement, as a general rule, and this in turn results in increased intracranial hemorrhage. Bleeding is therefore strongly indicated, not only to prevent inflammation, but also to prevent further leakage into the brain-substance.

The method by which venesection is practised is yet to be described. It is a very simple operation if an assistant is present to make pressure on the vein or entire arm. Often this pressure is best exercised by means of a handkerchief or bandage tightly twisted about the arm above the spot where the incision is to be made. Under these circumstances the veins of the arm become prominent and distended, and one of them may be readily bared by a short longitudinal incision of half an inch, the fascia being separated until the glistening blue surface of the vessel appears free from fat or connective tissue. Into this vessel, with the edge of the knife turned upward, a small longitudinal incision is made, care being taken that the point of the blade is not driven in far enough to injure the posterior wall of the vein. If a clot forms and stops the flow, it must be removed by an aseptic cloth, while if the flow is to be stopped we may remove the bandage above and apply a compress over the incised vein, which compress may be held in position by a bandage.

FOODS FOR THE SICK.

PEPTONIZED MILK.

TAKE a perfectly clean, clear glass quart bottle and place in it one of Parke, Davis & Co.'s peptonizing tablets, or the contents of one of Fairchild's peptonizing tubes, and a teacupful of cold water, and after shaking pour into the bottle a pint of perfectly fresh, cool milk and stir the mixture thoroughly. Next place the bottle containing the milk in a can of water at such a temperature that the whole hand may be submerged in it without pain. If complete digestion of the milk is desired, this application of heat may be continued as long as twenty minutes, but in most cases five minutes are sufficient. If carried on longer than five minutes, the milk will become bitter and disagreeable to the taste through the development of peptone in excess.

Immediately after taking the bottle from the hot water it should be placed on ice, in order to check further peptonizing and to keep the milk from spoiling; or if the ice is not available the water-bath should be quickly brought to a boil in order to prevent further action of the ferment, and the bottle corked and then be put in a cool place. This recipe may be used where it is thought necessary to digest the milk before it is swallowed. Where we desire simply to aid digestion it is best to follow the directions already given, except that the bottle is not heated, but at once placed upon ice and allowed to remain there, being slightly warmed when it is desired to give it to a child, or it may be given as a cool and refreshing drink to an adult, the heat of the body rapidly causing the ferment to do its work as soon as the food enters the stomach. When irritability of the stomach exists in adults, this peptonized milk may be made more agreeable to the taste by following the directions given in the first recipe, except that it must remain in the hot water for no less than two hours, when it is poured out into a tin cup or pan and rapidly brought to the boiling-point. After this it is strained through a piece of coarse muslin and placed upon ice. Before giving it to a patient this mixture may be flavored with lemon- or orange-juice or any form of acid that is desired, without the milk becoming curdled. Peptonized milk punch is made from milk prepared in the way already described in the first recipe by adding St. Croix or Jamaica rum or brandy, and is a pleasant nutrient, particularly if the surface of the liquid is sprinkled with a little grated nutmeg.

A very refreshing and agreeable drink may be made by diluting peptonized milk one-half with highly-charged carbonic-acid water, and swallowing it while effervescing.

PEPTONIZED BEEF.

The following method of preparing Peptonized Beef is recommended by the Fairchilds, and is very useful, as is also peptonized oyster stew, as first introduced by the author's friend, the late Dr. N. A. Randolph.

Take ¼ pound of finely-minced raw *lean* beef; cold water, ½ pint. Mix in a saucepan. Cook over a gentle fire, stirring constantly until it has boiled a few minutes. Then pour off the liquor for future use, beat or rub the meat to a paste, and put it into a clean fruit-jar with ½ a pint of cold water and the liquor poured from the meat, and add

Extracti pancreatis	20 grains (1.3).
Sodii bicarb.	15 " (1.0).

Shake well together, and set aside in a warm place, at about 110° to 115° F., for three hours, stirring or shaking occasionally; *then boil quickly*. The liquid may then be strained or clarified with white of egg in the usual manner, and seasoned to taste with salt and pepper.

In the great majority of cases it is not necessary to strain the peptonized liquor, for the portion of meat remaining undissolved will have been so softened and acted upon by the pancreatic extract that it will be in very fine particles and diffused in an almost impalpable condition, and is therefore in a form ready for assimilation in the body.

Peptonized Oysters.—Peptonized Oysters are prepared by mincing six to twelve large oysters, and adding to them, when mixed with a moderate amount of their own liquid, 5 grains (0.35) of pancreatin or peptonizing powder and 20 grains (1.3) of sodium bicarbonate. The cup containing this mixture is now placed in warm water at 100° F., and allowed to remain there from ten to twenty minutes, according to the degree of digestion desired. After this the liquid mass is quickly brought to a boil to cook the oysters and stop digestion, and served with pepper and salt as required. Any condiment or flavoring substance may be used.

PEPTONIZED ENEMA.

A very useful nutrient enema may be prepared by following the directions given above for peptonizing milk, except that an egg, yelk and white, should be beaten up in the milk before the ferment is added. The effect of this enema may be increased by the addition of a teaspoonful to an ounce of whiskey or wine. This should be warm when injected into the rectum.

DIGESTED GRUEL.

Digested Gruel may be made by taking thoroughly boiled hot gruel made from oatmeal, barley, wheat, or from arrow-root, to the amount of ½ pint (250 cc.), and adding thereto, while it is hot, ½ pint (250 cc.) of fresh, cold milk; to this may now be added the contents of one peptonizing tablet or tube, and the mixture allowed to stand in moderately hot water or in a warm place for twenty minutes before it is placed upon ice.

KOUMYSS.

This is a preparation of milk which is very useful for children and adults during convalescence from acute or subacute exhausting diseases. Even young children of three or four years will take a fancy to it if it is not made too sour by continuing the fermentation process too long. The liquid is prepared as follows: Add to 1 pint (500 cc.) of cool, perfectly fresh milk 2 teaspoonfuls (8.0) of sugar, and place it, after shaking thoroughly, in a clear beer or claret bottle. Then add ⅛ of a cake of Fleischman's compressed Vienna yeast, and tightly cork the bottle, standing it in a warm place or in a water-bath at 99° to 100° F. for eight to ten hours. Then place in a cool place or on ice and use as needed. It must be remembered that the development of carbonic gas is very great in this liquid, and that if an ordinary cork is inserted it must be tied in before the heat is applied. Further than this, the cork must be pulled very gently or the liquid will spurt all over the room. The best thing to use when about to open a bottle of koumyss is a "champagne tap," by means of which the liquid may be drawn off as needed.

DIET LIST.

The following bills of fare are used in the Children's Hospital in this city with good results, are easily prepared, and the directions readily carried out by the inexperienced:

Diet in Gastro-intestinal Catarrh for a Child of Seven Years.

Breakfast, 7.30 A. M.: Milk, with lime-water; 4 teaspoonfuls of lime-water to each tumblerful of milk. The lightly-boiled yelks of two eggs, thin slices of well-toasted bread or stale bread.

Dinner, 12 M.: A mutton-chop without fat, broiled, or a slice of roast beef or mutton, occasionally a bowl of meat broth. Stale bread or toast.

Supper, 7 P. M.: Milk and lime-water. Stale bread or toast, or milk-toast.

For drink: Filtered or boiled water.

Starch foods to be avoided as much as possible.

Diet for a Child Two Years Old.

Breakfast, 7.30 A. M.: Milk. The lightly-boiled yelk of an egg. Thin bread and butter (the bread to be one day old).

Lunch, 11 A. M.: Milk. A thin slice of bread and butter.

Dinner, 1.30 P. M.: Beef-tea or small piece of minced roast beef or mutton devoid of gristle. One well-mashed potato, moistened with gravy. Rice and milk.

Supper, 6 P. M.: Milk. Bread and butter.

For drink: Boiled or filtered water.

Diet for a Child One Year Old (5 meals a day).

First meal, 7 A. M.: 2 teaspoonfuls of grated flour-ball (prepared as directed below) in ½ a pint of milk.

Second meal, 10.30 A. M.: ½ a pint of milk with 4 tablespoonfuls of lime-water.

Third meal, 2 P. M.: The yelk of 1 egg beaten up in 1 teacupful of milk.

Fourth meal, 5.30 P. M.: Same as the first.

Fifth meal, 11 P. M.: Same as the second.

Flour-ball is to be made by taking one pound of good flour—unbolted, if possible—tie it up *very tightly* in a pudding-bag; put it in a pot of boiling water early in the morning, and let it boil until bed-time, then take it out and let it dry. In the morning peel off the surface and throw away the thin rind of dough, and with a grater grate down the hard, dry mass into a powder. To use this, take from 1 to 2 teaspoonfuls of the powder, rub it down until smooth with a tablespoonful of cold milk, and add 1 tumblerful of hot milk, stirring it well all the time.

Diet for a Child from Six to Twelve Months Old (5 meals a day).

First meal, 7 A. M.: Mellin's food 1 tablespoonful or flour-ball grated 1 or 2 teaspoonfuls (prepared as directed above), hot water 4 tablespoonfuls; warm milk enough to make ½ a pint. Dissolve the Mellin's food or rub down the grated flour-ball in the hot water by stirring, then add the milk; mix thoroughly.

Second meal, 10.30 A. M., and third meal, 2 P. M.: A breakfast-cupful of milk with 4 tablespoonfuls of lime-water.

Fourth meal, 5.30 P. M.: Same as first.

Fifth meal, 10.30 P. M.: Same as second.

BEEF TEA.

Take 1 pound of lean beef and mince it. Put it, with its juice, into an *earthen vessel* containing a pint of *tepid water*, and let the whole stand for one hour; strain well, squeezing all the juice from the meat. Place on the fire, and slowly raise *just to the boiling-point, stirring it briskly* all the time. Season with salt and pepper to taste. In administering this always be careful to stir up the sediment.

Or, take 2 pounds of beef, without fat or bone, half a breakfast-cupful of cold water; place it in a jar in a saucepan of water. Simmer four hours.

RESTORATIVE BEEF ESSENCE (*Ringer*).

Take 1 pound of fresh beef, free from fat, chop it up fine, and pour over it 8 ounces of soft water, add 5 or 6 drops of hydrochloric acid and 50 or 60 grains of common salt; stir it well, and leave it for three hours in a cool place. Then pass the fluid through a hair sieve, pressing the meat slightly, and adding gradually toward the end of the straining about 2 ounces more of water. The liquid thus obtained is of a red color, possessing the taste of soup. It should be taken cold, a teacupful at a time. If preferred warm, it must not be put on the fire, but heated in a covered vessel placed in hot water. Should it be undesirable for the patient to take the acid, this soup may be made by merely soaking the minced beef in distilled water; or, take 1 pound of lean beef, free from fat and skin, chop it up very fine, add a little salt, and put it into an earthen jar with a lid, such as is used for roasting venison, fasten up the edges with a thick paste, and place the jar in the oven for three or four hours. Strain through a coarse sieve, and give the patient two or three teaspoonfuls at a time; or, cut up in small pieces 1 pound of lean beef from the sirloin or rump, and place it in a covered saucepan, with ½ a pint of cold water, by the side of the fire for four or five hours, then allow it to simmer gently for two hours, skim it well, and serve.

BARLEY-WATER.

To prepare barley-water, put two good-sized teaspoonfuls of washed pearl barley with 1 pint of cold water in a saucepan, and boil slowly down to two-thirds. Strain.

Barley-water for Adults.

Take of finest barley ¼ pound; to this add 1 quart of water and boil to 1 pint; strain and add 1 quart of boiled milk. To this add 6 ounces each of brandy and lime-water; sweeten to taste; flavor with nutmeg and rind of lemon rubbed with sugar. This forms a most nourishing and palatable drink when kept cold on ice.

RICE-WATER.

Rice-water is made by boiling 2 ounces of clean rice in 2 quarts of water for an hour and a half.

WINE-WHEY.

Boil 1 pint of fresh milk; while boiling pour in 1 small tumblerful of sherry wine (8 tablespoonfuls); bring it to the boil a second time, being careful not to stir it; as soon as it boils set it aside until the curd settles, and pour off the clear whey.

ALMOND BREAD FOR DIABETICS.

Take of blanched sweet almonds ¼ pound; beat them as fine as possible in a stone mortar; remove the sugar contained in this meal by putting it into a linen bag and steeping it for a quarter of an hour in boiling water acidulated with vinegar; mix this paste thoroughly with 3 ounces of butter and 2 eggs. Next add the yelks of 3 eggs and a little salt, and stir well for some time. Whip up the whites of 3 eggs and stir in. Put the dough thus obtained into greased moulds, and dry by a slow fire.

BRAN BREAD FOR DIABETICS.

Take a sufficient quantity (say 1 quart) of wheat bran; boil it in two successive waters for a quarter of an hour, each time straining it through a sieve; then wash it well with cold water (on the sieve) until the water runs off perfectly clear; squeeze the bran in a cloth as dry as possible, then spread it thinly on a dish and place it in a slow oven; if put in at night, let it remain until morning, when, if perfectly dry and crisp, it will be fit for grinding. The bran thus prepared must be ground in a fine mill and sifted through a wire sieve of such fineness as to require the use of a brush to pass it through; that which remains in the sieve must be ground again until it becomes quite soft and fine. Take of this bran powder 3 ounces (some patients use 4 ounces), the other ingredients as follows: 3 new-laid eggs, 1½ ounces (or 2 ounces if desired) of butter, and about ½ pint of milk; mix the eggs with a little of the milk, and warm the butter with the other portion; then stir the whole well together, adding a little nutmeg or ginger or any other agreeable spice. Bake in small tins (patty-pans), which must be well buttered, in a rather quick oven for about half an hour. The cakes, when baked, should be a little thicker than a ship's biscuit: they may be eaten with meat or cheese at breakfast, dinner, and supper; at tea they require rather a free allowance of butter, or they may be eaten with curd or any of the soft cheeses.

"It is important that the above directions as to washing and drying the bran should be exactly followed, in order that it may be freed from starch and rendered more friable. The bran in its common state is soft, and not easily reduced to fine powder. In some seasons of the year, or if the cake has not been well prepared, it changes more rapidly than is convenient, owing to moisture. This may be prevented by placing the cake before the fire for five or ten minutes every day."

MULLED WINE.

Boil some spices, cloves, nutmeg, cinnamon, or mace in a little water, and add as much of this decoction as is necessary to flavor a wineglassful of sherry or any other wine. Add sugar to taste, and bring the mixture to the boiling-point. If claret is used, it will require more sugar than if a less sour wine is employed. The vessel for heating the wine should be scrupulously clean.

WATERED TOAST.

Brown several pieces of bread, and carefully butter the toast so that the butter is equally distributed. Place enough salt over the toast to flavor it and add pepper to taste. Finally pour as much boiling water on the edges of the crust as is necessary to thoroughly soak them, and serve to the patient. This is a more agreeable dish than would be imagined, and is useful where milk toast is distasteful.

JUNKET.

Add from ½ to 1 teaspoonful of Parke, Davis & Co.'s pepsin cordial or Fairchild's essence of pepsin to a pint of milk, which should be at body-heat. Place the milk in a cool place, and after the curd has formed serve cold and flavor with powdered nutmeg or vanilla. If there be too great feebleness of digestion to digest the curd, the liquid whey may be given, as it contains the salts and soluble albuminoids of milk.

PART IV.

DISEASES.

ABORTION.

THE treatment of abortion divides itself into three parts: the first for its prevention, the second for its arrest when threatened, the third for its proper care when inevitable.

In the preventive means we find, as in nearly every branch of medicine, that the use of hygienic measures is more important than the employment of drugs. If the previous abortions are known to be due to syphilis, endometritis, or uterine displacements, these conditions must be relieved by the proper remedies. If there exists no apparent cause for the interruption of normal gestation, the patient should use a simple diet, lead a quiet life, avoid all sexual intercourse, sleep on a hard bed, and resort only to gentle exercise. Fresh air is, however, a necessity, and should be plentifully supplied. The food should be light, but nutritious and palatable, and a sufficient variety supplied to avoid any repugnance to a given dish. In many cases abortion rests upon deficient nutrition of the fœtus, either by reason of faulty assimilation on the part of the mother or because of poor food, so that if anæmia, debility, or other impoverished states of the maternal system be present, these should be treated at once. The clothing should be loose, the night's sleep undisturbed and of full length, and the mind be set at rest as far as possible in respect to household and other worries, and particularly diverted from the thought of possible uterine disturbance.

The use of drugs is to be limited strictly to the fulfilment of a distinct indication, and the employment of cathartics is to be avoided, the bowels being kept in order by fresh fruits in moderate quantity or by mild laxatives, such as cascara sagrada in small doses and compound liquorice powder. If these fail, rhubarb may be resorted to, and castor oil in capsule may be used. Podophyllin, senna in full doses, saline purges in active amounts, and aloes are not to be used if they can be avoided. If the woman be exceedingly stout and plethoric, saline purges are indicated to act as depletants. It is hardly necessary to add that elaterium and scammony or jalap are not safe, and can only be used if dropsy and ascites are present, and where we must choose the least of two evils. Strychnine, which stimulates the spinal cord, should never be employed, and cantharides, oil of erigeron, and manganese ought not to be used unless they are for some reason very necessary. Although quinine is not of itself abortifacient, it is unsafe if an abortive tendency is present, and can only be used in cases in which the abortion is brought on by malarial poisoning, when it will act as a preventive.

The only drug which seems to be of any service as a prophylactic to be taken all through pregnancy is the fluid extract of viburnum prunifolium, the dose of which is ½ to 1 drachm (2.0–4.0). This drug is said to be a uterine sedative and to have no injurious effects upon the mother or child.

Cimicifuga racemosa is probably equally valuable as a prophylactic against abortion in the dose of 10 to 20 drops (0.65–1.3) of a good sample of the fluid extract, given night and morning.

The arrest of threatened abortion is one of the most difficult duties which come to the physician, and there is no doubt that large doses of morphine or opium are the best means of quieting the uterus that we have. While viburnum prunifolium may be resorted to, we do not know enough of it to rest assured of its value, but it should be tried if opium is not at hand or fails. The patient should be at once quietly placed in bed in the most comfortable position, be so covered as to prevent overheating and taking cold, and receive by the hypodermic needle ¼ grain (0.016) of morphine, or, better still, a rectal injection of warm starch-water containing 30 drops (2.0) of laudanum. The bulk of the injection should be small in order not to disturb the bowels, and must be at the bodily temperature. If this is not done, a suppository of the aqueous extract of opium, containing ¼ to ½ grain (0.016–0.03), should be used. Ice-cold drinks should be given, and no tea or coffee allowed. This treatment quiets the uterus, allays nervousness and restlessness, and at least puts off the abortion for a few hours. Venesection has been practised in very plethoric women with advantage.

When an abortion is inevitable, it is to be treated by measures directed to the avoidance of hemorrhages, the thorough delivery of the ovum and its appendages, and the prevention of inflammation and septicæmia. For the prevention of hemorrhage a number of balls of absorbent cotton tightly wound with thread to the size of a small egg should be packed into the vagina back of and around the cervix until the bleeding is controlled, and, while a small amount of iodoform may be dusted over them before they are inserted, no astringents are to be applied, unless it be tannic acid to coagulate the blood in the cotton, as astringents cannot reach the bleeding spot. Sponges ought never to be used, as they often fail to control the bleeding and rapidly become septic. By means of this packing the blood in the uterus cannot escape, and, as the uterine walls contract, they urge the liquid between the membranes, thereby causing complete separation. Ergot should be used after the tampons are applied in the dose of a fluidrachm of the extract or a tablespoonful or two of the wine. Generally after twenty-four hours the removal of the tampons will show the ovum to be in the vagina, but if part of it remains in the uterus, the following measures should be resorted to: The administration of ergot should be stopped unless the hemorrhages are severe, and the uterine cavity is to be cleared by the use of the fingers of the attendant, who grasps the membranes and draws them away. In skilful hands the curette may be employed. If the cervical canal is too small, it must be dilated by dilators or by packing it with sponge tents. After the membranes are removed the tincture of iodine may be applied to the inner surface of the uterus as a hæmostatic, antiseptic, and alterative, or, better still, the uterus should be douched with a 2 per cent. solution of creolin in warm water, about a quart being used.

The after-treatment consists in the use of small doses of ergot and quinine, of vaginal antiseptic irrigation, or even of uterine irrigation if it is needed, and the maintenance of perfect rest for one or two weeks, or longer if possible. Ergot ought not to be given if there is reason to believe that portions of the membranes or blood-clots are in the uterus, as by contraction of the os uteri it may imprison materials which then become septic. (See Puerperal Diseases.) Should fever arise, the uterus should be carefully curetted and the intra-uterine douches of creolin continued until the fever disappears.

ABSCESS.

The medical treatment of abscess resolves itself into the use of drugs to prevent the further formation of pus, to cause its fatty degeneration and absorption, to quiet the systemic disturbance if the inflammation be severe, and to support the body if the suppuration be prolonged or in large amount or if debility exists. The treatment may also be divided into that suited to acute and that to chronic abscess.

As acute abscess in its early stages is simply a localized inflammation with hyperæmia and an outpouring of leucocytes, it may often be modified by the use of aconite or veratrum viride in full dose to quiet the circulatory excitement and relieve the congestion. This is particularly true where the pain is pulsating. At the same time, if the swelling is superficial, a poultice, made by moistening bread-crumbs with lead-water, should be placed over it, or lead-water may be placed on lint and applied in this way. Belladonna ointment smeared over the same area may be of service, and the tincture may be used internally if aconite cannot be had. If a gland be involved, the needle of a hypodermic syringe may be inserted obliquely into its centre and 5 to 10 minims (0.3–0.65) of a 2 per cent. solution of carbolic acid injected into the swelling. This method has been found of singular efficacy in bubo where pus seemed just about to form. It is almost always curative, but should not be used in a stronger or weaker solution than that named. Another useful abortive method for the treatment of the early stages of abscess is the application, externally, of a strong solution of nitrate of silver, 20 to 40 grains to 1 ounce (1.3–2.6 : 32.0) of water, by means of a camel's-hair brush, all over the skin, covering the area involved, or by the use of the tincture of iodine in a similar manner.

Internally, calx sulphurata, in the dose of $\frac{1}{10}$ grain (0.006) given every hour or two, may be used as an abortive, or at least to promote arrest and cause absorption. If it becomes evident that pus is going to form, then resort must be had to poultices, which by their heat and moisture will aid in the formation of pus by favoring the escape of leucocytes and by softening the tissues. The best form of poultice for this purpose is to use lint which has been saturated with a 1 : 4000 solution of mercuric chloride, the moisture being retained by a piece of rubber dam placed over the lint. If pus forms and fluctuation ensues, the abscess should be freely opened, drained, washed out by a solution of carbolic acid in the strength of 1 : 20, or of bichloride solution 1 : 5000, and dressed with antiseptic gauze. If it is tubercular, the abscess may be opened in the ordinary manner, all diseased tissues removed by scraping, and the cavity packed with iodoform gauze, or it should be drained by aspiration, and an ethereal solution of iodoform injected and allowed to remain in the abscess-cavity if it is a small one. The opening is now closed by a pledget of cotton wet with tincture of benzoin, and an antiseptic dressing applied over it. Not more than 20 grains (1.3) of iodoform should be so used in the treatment of tubercular abscess, as larger amounts have caused poisoning.

A very good treatment for slow abscess is to wash out the cavity with a 10-volume solution of peroxide of hydrogen, provided there is a free exit for the gas which is given off.

If the abscess is chronic (cold abscess) and associated with great weakness, resort must be had to the internal use of iron in the form of the tincture of the chloride, cod-liver oil with hypophosphites, quinine as a tonic to prevent hectic fever, and the use of nutritious, easily-digested food. Alcohol may be used and should be given with milk or in egg-nogg.

The following tonic pill or solution is of service:

℞.—Strychninæ sulph. . . . . gr. j (0.05).
Ferri redact. . . . . gr. xv (1.0).
Quininæ sulph. . . . . gr. xx (1.3).—M.
Ft. in pil. No. xx.
S.—One t. d. after meals.

Or,

℞.—Tr. cinchonæ comp.
Tr. gentian. comp. . . . . āā f℥iij (96.0).—M.
Tr. cardamom. comp.
S.—Dessertspoonful (8.0) t. d. after meals.

Having described the means of treatment, it is to be explained how these measures act. The aconite quiets the circulation and thereby relieves the inflammation, the lead-water acts locally as an astringent and sedative, while the belladonna by its action on the blood-vessels contracts the dilated capillaries and allays pain. When carbolic acid is injected into an enlarged gland, it acts as an anæsthetic, as an antiseptic, and as an astringent and stimulant. The nitrate-of-silver applications act by constringing the blood-vessels, as local sedatives, and as counter-irritants. The iodine applications do likewise, and also exercise an alterative influence.

The physiological action of calx sulphurata is unknown. The object in using the antiseptic irrigations is self-evident, and the employment of iodoform in tubercular abscess rests upon the studies of Bruns of Tübingen and many others, who have found by experiment that the use of iodoform is fatal to the bacillus tuberculosis.

As large numbers of corpuscles are destroyed in the formation of pus, and other sources of vitality are sapped by its formation, the use of hypophosphites and iron to replace the loss is necessary, and of cod-liver oil and tonics to increase the blood-corpuscles and the ability to assimilate food.

ACNE.

This affection occurs in so many forms and arises from such different causes that a thorough consideration of its treatment cannot be here given: suffice it to state that arsenic is a remedy which will often aid in the cure and prevent a relapse if used in small doses for a long period; that is, 1 to 3 drops (0.06–0.18) of Fowler's solution three times a day for a month or two. This is particularly useful if debility and anæmia underlie the disease. If the anæmia be marked, the proper treatment is that directed to the cure of this condition (see Anæmia); if obstinate constipation is present, relief must be obtained by saline purges and the bowels kept in order by cascara sagrada or some similar drug. If scrofulosis exists, cod-liver oil is of great service, or if much pustulation is present, calx sulphurata, in the dose of $\frac{1}{10}$ to $\frac{1}{8}$ of a grain (0.006–0.008), may be used in pill form three times a day. In menstrual acne sulphur may be used internally to open the bowels and applied as a wash to the face in the following form:

℞.—Sulphuris . . . . ʒj (4.0).
Glycerini . . . . f℥j (32.0).
Aquæ rosæ . . . . q. s. ad f℥viij (250.0).—M.
S.—Apply twice or thrice a day.

Or the following may be used in cases of severe inflamed acne:

℞.—Sulphuris iodidi . . . . gr. xxx (2.0).
Cerati simplicis . . . . ℥j (32.0).—M.
S.—Apply to the parts night and morning.

If the skin is very atonic, muddy, and torpid, it should be bathed night and morning with hot water and castile soap, or even with the tincture of green soap, and well rubbed with a wet towel. After this the following salve may be thoroughly applied:

℞.—Sulphur. precip. . . . . ʒss.
Lanolin, }
Adepis, } . . . . āā ℥ss.—M.
S.—Apply as directed.

If the green soap causes irritation, some bland application should follow it, such as simple cerate or the emulsion of the oil of bitter almonds. If the pustules be large, they may be incised and vent given to their contents, the sac being touched with a drop of carbolic acid. If induration is great, ichthyol ointment of the strength of 20 parts of ichthyol to 100 of lard should be well rubbed in, or resorcin, 10 to 20 grains to the ounce of lard (0.65–1.3 : 32.0), be applied. Mercurial ointment may also be used to relieve induration, but several days must elapse between its use and that of sulphur, as a black sulphuret of mercury may be formed and stain the face.

The diet should be carefully regulated and fatty foods avoided.

ADENITIS.

Adenitis is an inflammation of the lymphatic glands, generally arising from scrofulosis, unless there be some specific trouble, such as syphilis, present. Less commonly it occurs in the neck from the irritation produced by the eruption of milk-teeth, sometimes from blows or exposure to cold.

If the condition consists in a simple enlargement, it should be treated by inunctions of iodine ointment and lard, half-and-half, night and morning, care being taken that the use of the ointment is stopped as soon as any reddening of the skin appears or if fluctuation develops. If the ointment cannot be used, the tincture of iodine should be thoroughly painted over the swelling with a brush, but this treatment is less efficacious. The following prescription makes a useful application:

℞.—Ichthyol . . . . ʒiv (16.0).
Adipis benzoinat. . . . . ℥ij (64.0).—M.
S.—Rub a small piece of the ointment into the swelling t. d.

Syrup of the iodide of iron, in the dose of 5 to 20 drops (0.35–1.3), is to be given if the patient is a child, and tonics must be used to improve the systemic condition. As soon as fluctuation or reddening shows the formation of pus, all this treatment should be stopped, and a poultice be applied for twenty-four or forty-eight hours till the swelling goes down or is ready for lancing. Lancing is better than allowing the abscess to break, as the scar left in after years is a mere line instead of a large cicatrix.

If the enlargement be tuberculous—and a large number of these cases are so infected—the following treatment, recommended by Treves and Grünfeld, is of value and should be insisted upon.

The entire removal of the glands should be effected by dissection alone; directors, handles of scalpels, or fingers should be used to separate the glands from the surrounding cellular tissue as closely from the capsule as a nerve is cleaned in the dissecting-room. When sufficient of the anterior surface is exposed, a thick thread is passed through the gland and drawn gently, when, by continuing the dissection, the operator may gradually get to the back of the gland, removing portions of the mass at a time. The cavity should be packed with iodoform gauze, and the walls scraped if an abscess has existed.

ALCOHOLISM.

(See Alcohol.)

ALOPECIA.

This disease, when due to a parasite, is best treated, according to Crocker, by first pulling out all the loose hairs around the bald spot and then painting the affected surface with linimentum cantharidis (liquor epispasticus). Three coats of this liquid should be employed, and each coat allowed to dry before the next is applied. In other cases an ointment of chrysarobin, ½ to 1 drachm (2.0–4.0) to the ounce (32.0) of lanolin, may be used, but care must be exercised that too much staining of the skin and clothes does not result. Another equally good application is 2 grains (0.1) of mercury bichloride to 1 drachm (4.0) of rectified spirit and 7 drachms (28.0) of oil of turpentine. This mixture may be rubbed in with the finger over and around the patch. If the patient's skin will stand it, 5 grains (0.3) of the corrosive sublimate may be used in place of 2 grains (0.1).

AMBLYOPIA AND AMAUROSIS.

Amblyopia (or dull vision) and amaurosis (or blindness) usually refer to defective sight or its total loss, the result of functional disturbance of the retina, optic nerve, or visual centres, and unaccompanied by changes in the eye-grounds in the beginning of the disease. These terms, however, also include cases of partial or complete blindness in which optic-nerve atrophy subsequently develops, and are often used to describe ocular disorders not limited by the definitions here employed.

These cases may be gathered into certain groups:

I. Congenital amblyopias and amblyopias from non-use of the eyes.

In the former there is often a high degree of error of refraction, usually far-sightedness; the latter is seen when an eye is debarred from binocular vision by a squint. In both the treatment consists in as perfect a correction of the optical error as possible, and, in case one eye alone is involved, the separate exercise of its functions. Congenital amblyopias may include incurable defects in the structure of an eye.

II. Amblyopias the result of (*a*) general diseases or conditions—typhoid fever, the exanthemata, syphilis, scurvy, malaria, colds, etc.; (*b*) local diseases or conditions—hemorrhoids, hemorrhage, pregnancy, disordered menstruation, kidney disease, diabetes, migraine, disorders of the nervous system, etc.

The remedies indicated by the special cause are to be employed, the medicinal agents most usually needed being mercury, iodide of potassium, pilocarpine, particularly in uræmic amaurosis, emmenagogues, and tonics, especially hypodermics of strychnine. As local measures repeated fly-blisters to the temples, wet and dry cups, and the constant electric current are used. The nape of the neck may be cauterized. In hysterical cases metallotherapy may be tried.

III. Amblyopias the result of the action of certain medicinal and toxic agents.

The abuse of alcohol, and particularly of tobacco, produces a form of amblyopia characterized by the development of a scotoma or an area in the centre of the field of vision in which the appreciation of red and green is lost or greatly diminished. Quinine in excess has, in a number of instances, being followed by temporary blindness, which is usually denominated quinine amaurosis. Of less frequent occurrence are the cases of amblyopia produced by the toxic action of salicylic acid, lead, silver, mercury, osmic acid, nitrobenzol, filix mas, and the vapor of sulphide of carbon. In all instances the patient must be withdrawn from the influence of the poison; in tobacco amblyopia, in its early stages, this is usually sufficient to effect a cure. The remedies which have proven of the greatest utility are digitalis, inhalations of nitrite of amyl, nitroglycerin, and strychnine. Iodide of potassium should be exhibited in chronic cases, and always in amblyopias the result of lead-poisoning. The constant current has also been employed.

IV. Amblyopias the result of direct or indirect injury or from reflex irritations.

Traumatic amblyopias may follow a blow upon the eye itself or an injury to the skull or spinal cord. To carious teeth, intestinal irritations, and the presence of parasites a certain number of amblyopias have been attributed, but, while it is not possible to disprove the association, such cases must be received with doubt. After the removal of the cause strychnine should be exhibited.

Optic neuritis most frequently depends upon coarse diseases of the brain (tumor, abscess) or inflammation of its membranes (meningitis). It is also a symptom of numerous disorders—suppression of the menses, exposure to cold, rheumatism, anæmia, syphilis, uræmia, lead poisoning, etc. The remedies are those naturally suggested by the disease or condition which has called it into existence. The prognosis depends upon the cause. Mercury, iodide and bromide of potassium, the salicylates, pilocarpine, local bloodletting, and fly blisters are the remedies commonly employed.

Optic-nerve atrophy is either primary or secondary to disease of the brain or spinal cord or consecutive to an antecedent neuritis. After all irritation has subsided the greatest improvement may be expected from hypodermic injections of strychnine, which should be pushed to the point of tolerance. Temporary improvement follows the inhalation of nitrite of amyl, and, in the hope of improving the circulation in the optic nerve, nitroglycerin, digitalis, and similar cardiac tonics may be employed. The constant electric current has been employed with benefit, especially by voltaic alternations, which are more active than simple closures. The following remedial agents have also been employed: Suspension, stretching the optic nerve, Séquardian injections, nitrate of silver, lactate of zinc, phosphorus, and, quite recently, hypodermics of antipyrine. Mercury may be used with benefit in early stages of the degenerative process, but is of doubtful value in advanced cases. It may be administered in the usual manner or by subconjunctival injection in the dose of $\frac{1}{20}$ mg. Suspension and injections of testicular juice have little or nothing to commend them.

AMENORRHŒA.

This condition depends upon so many causes for its existence that it must be treated in many different ways. If ordinary anæmia or chlorosis shows that there is a deficient supply of blood, measures adapted to the relief of such a state are required (see Anæmia). In amenorrhœa due to constipation saline purges or other laxatives may be used, and the best of these purges is aloes; and, as constipation and anæmia often exist hand in hand, a combination of aloes and iron in a pill is commonly resorted to. The iron improves the blood, and the aloes stimulates and congests the pelvic viscera by bringing blood to the sexual organs. Aloes also seems to increase the assimilation of iron in some unknown manner. The following pill is often of service, and is especially recommended by Goodell:

℞.—Extract. aloes aqueosi	ʒj (4.0).
Ferri sulphat. exsiccat.	ʒij (8.0).
Asafœtidæ	ʒiv (16.0).

Ft. in pil. No. c.
S.—From one to three pills three times a day.

Cimicifuga has been highly recommended in chronic and apparently causeless amenorrhœa in the dose of 30 drops (2.0) of the fluid extract at the time for a proper flow to occur. Within the last few years the binoxide of manganese, in the dose of 1 to 3 grains (0.05–0.15), has come prominently forward as a remedy in simple idiopathic amenorrhœa, and is undoubtedly of service, but it should be taken for at least two weeks before the date upon which each menstruation is expected to occur. Potassium permanganate is also useful during the same period, but it is inferior to the binoxide of manganese in the author's experience.

Apiol, the active principle of parsley, may be given in capsules in the dose of 3 to 10 grains (0.15–0.65) for the same condition, and oils of rue, savine, and tansy have also been employed in capsule in the dose of 5 drops (0.1) three times a day.

In all forms of amenorrhœa a hot sitz-bath at the time for the expected "period" is of service, more particularly if the patient has "caught cold." The bath should be persevered in for several nights, and care should be taken to avoid exposure. Often a little mustard added to the water will increase the efficacy of this treatment.

Under the name of "Dewees's Emmenagogue Mixture," first devised by Professor Dewees of Philadelphia, the following formula has been largely used in functional and organic amenorrhœa:

℞.—Tinct. ferri. chloridi	fʒiij (12.0).
Tinct. cantharidis	fʒj (4.0).
Tinct. guaiac. ammon.	fʒjss (6.0).
Tinct. aloes	f℥ss (16.0).
Syrupi	q. s. ad f℥vj (192.0).—M.

S.—Tablespoonful (16.0) three times a day.

ANÆMIA.

It is, unfortunately, only too true that the entire subject of blood-making and blood-breaking is as yet very imperfectly understood, but many of our therapeutic facts rest on rational ground now, if not before, and if the pathologists will give us more information upon these subjects, new remedial measures will be introduced or their empirical employment placed on a rational basis. Practically speaking, the therapeutist recognizes two very important points, the causes of which the pathologist must eventually solve—namely, that one class of anæmias are due to defective or deficient hæmogenesis, and another to excessive hæmolysis. The former are generally believed to form the simple class, and the latter the essential or pernicious class. It is in the excessive hæmolysis class that we most frequently fail to produce good results. More than this, the causes of excessive hæmolysis are so various that we can further divide them into removable and permanent, the removable being represented by the cases in which copræmia or auto-intoxication takes place, while the others are represented by the true pernicious anæmia, about which we really know very little, save that most observers find evidence of profound hæmolysis in the percentage of iron in the liver, while in the dark-colored urine they believe a destructive agent exists which prior to its excretion has slaughtered many corpuscles. Unfortunately, it is at present impossible for us to separate clinically the hæmogenous anæmia from that of hæmolytic excess, unless we find evidence of great corpuscular disintegration in a copious elimination of hæmoglobin in the urine, or a jaundice evidently hæmatogenous in character, or a large number of defective corpuscles, which would perhaps indicate defective hæmogenesis rather than that they were scarred veterans of a battle with a poison in the liver-cells or elsewhere. Post-mortem signs often aid us in the differential diagnosis, but this is too late to be of any benefit to the doctor or patient.

There is one point, however, about which there can scarcely be any doubt, and that is that in many cases iron is greatly abused, being given when there is no indication for it or more frequently given in excessive dose. By excessive dose the author refers to as much as 6 to 10 grains in a day of reduced iron. The amount of iron in the human body is very small, and every study ever made of its absorption and elimination after absorption has shown that these processes are very slow. Hamburger recovered from the fæces nearly all the iron administered, and Jacobi proved that even when the iron was injected into the veins 10 per cent. was at once eliminated by the bowels, liver, and kidneys, and the remainder deposited in the liver, spleen, and other tissues in the same manner as is any metallic substance. The researches of Gottlieb have also been in confirmatory lines. When we consider that there is in the human blood only about 39 grains of iron, all told, we can see that the use of 12 grains a day in the course of a little over three days places a double quantity of the metal in the economy, which is not needed, and is either cast out or deposited at any convenient spot, there to lie undisturbed until it can be extruded.

Much, of course, depends upon the cause of the anæmia, but there is only one excuse for the use of the large doses of iron just named—viz., a condition of the digestive apparatus which results in the formation of a sulphide of iron in great quantity, so that only an infinitesimal amount escapes into the system. This perhaps explains the empirical fact that in some cases of chlorosis or intense anæmia iron has to be given in large doses to accomplish good results.

Perhaps the best and most recent studies on this subject are those of Ralph Stockman, who has given us a masterly summary of the subject of the absorption of iron in chlorosis. In this summary he points out that we have three chief theories as to the action of iron in anæmia. The first, the absorption theory, is based on the fact that as iron is taken into the body with the food, the iron of the hæmoglobin must be obtained from this source, and therefore that medicinal iron given by the mouth must be absorbed. The second theory rests upon the belief that iron is not absorbed when given by the mouth in addition to that in the food, but simply acts as a stimulant to the mucous membrane of the alimentary canal, therefore increasing the digestion of food, and so overcoming anæmia by the general improvement coincident upon proper nutrition. The third theory is that of Bunge—namely, that in chlorotic conditions there exists an excess of sulphur or sulphuretted hydrogen in the bowel, which changes the iron in the food into a sulphide of iron, which Bunge states cannot be absorbed. He believes that the inorganic iron which is given as a medicine saves the organic iron of the food by combining with the sulphur, and so indirectly cures the anæmia by the protection afforded the food-iron. It is important to remember that each of these theories has been supported by many careful experiments, but it is also well to bear in mind that the hypotheses and the experiments supporting them may be erroneously based. Thus, we have no right to imagine that the inorganic preparations of iron have a stimulating power over the alimentary mucous membrane, or, even if they have, that this power is exercised in the peculiar line of aiding in the absorption of the organic iron of the food. Again, the researches of Hamburger, Damaskin, Gottlieb, Müller, Jacobi, and Socin, which show that after the internal use of inorganic iron there is no increase in the iron in the urine, are valueless so far as the conclusions drawn by them are concerned—namely, that as there is no increase in iron in the urine, there is none in the blood, and therefore it is not absorbed. These conclusions are not justified, because they are based on the erroneous view that because iron is not in the urine it is not in the blood, and because it is not in the blood it is not absorbed. Every one knows that in the case of chronic lead poisoning, when the body is saturated with the metal, there is often no lead in the urine, the poison being deposited in the tissues; and if this is true of lead, it may be of iron. Particularly is this to be remembered when we find Stockman quoting the researches of Mayer, Bidder, and Schmidt, and a host of others, who have proved that we are not to look to the kidneys as the path for the excretion of iron, but to the intestinal walls. Finally, Stockman has proved that when iron is used hypodermically it cures anæmia when it cannot stimulate the digestion or counteract sulphides.

We learn from practical experience several things which science does not tell us—namely: Iron will not cure all cases of anæmia, even if they belong to a functional type, but other methods must be resorted to at the same time or separately for their cure. The insoluble salts of iron are better remedies for absorption than the soluble salts, because they are not precipitated in the stomach, and for this reason reduced iron is the best chalybeate for uncomplicated cases. Besides using iron in this form, we should employ laxatives if the bowels are confined; mineral acids, particularly nitric and nitromuriatic, for their effect on the function of the small intestine and liver; and, in addition, bitter tonics of a more or less simple form, according to the exigencies of the case, using quinine if malaria seems lurking in the body, simple bitters if the stomach lacks tone, aromatic bitters if from atony of the muscular coats the digestive tract seems sluggish, with a resulting formation and accumulation of flatus and digestive juices.

In many cases of anæmia there exists either as a cause or effect well-developed intestinal indigestion, and it is thought this results in the production of poisons which are responsible for the decrease in the corpuscular elements of the blood. The use of laxatives with the iron is not only necessary as already stated, but in addition, to overcome this production of toxic products, intestinal antiseptics, such as salol and beta-naphthol, are found useful.

The preparations of iron best employed in anæmia are the insoluble salts just named, such as Quevenne's iron and the carbonate, but there are indications for each salt which must be regarded. In many anæmic persons, particularly females, the tongue is broad and white, not from coating, but pallor—is flabby and torpid-looking. Under these circumstances the bowels should be kept moving by mild purges, and the sulphate or some other astringent preparation of iron be taken by the patient. In the anæmia caused by rapid childbearing and lactation cod-liver oil, the hypophosphites and phosphates of lime, should be used, while iron and quinine in tonic dose may be also of service. With some practitioners Blaud's pill is very much used, made as follows:

℞.—Ferri. sulph. exsiccat. }
Potassii carbonatis } . . . . āā. ʒij (8.0).
Syrupi . . . . q. s.—M.
Ft. in pil. No. xlviii.
S.—One to three pills three times a day, after meals.

Although it is perfectly true that we have almost no knowledge of the manner in which alteratives act in instances of disease where, through morbid functional activity, enlarged glands or growths appear, it is evident that they must act upon the trophic nerves or directly upon the nourishment of the affected parts. One thing we do know, however, and that is that small doses of most of the so-called alterative drugs act as very distinct stimulants to the development of normal structures, and in no instance do we find this more typically represented than in the effect which they exert upon the blood. Quite a number of years ago Keyes of New York emphasized the value of minute doses of mercury bichloride in syphilitic and other anæmias, and abundant clinical observation has certainly confirmed his views. The dose of bichloride of mercury in anæmia should be about $\frac{1}{40}$ of a grain (0.0016). Not only will minute doses of the bichloride of mercury act in this way, but small amounts of calomel or mercury itself will have such an effect.

Inunctions of very small amounts of mercurial ointment once a day or every other day, in adults and in children, will increase the fulness and redness of the cheeks and lips and the number of the corpuscles, the piece of ointment used being no larger than the half of a very small pea. This treatment will be found of service in cases not necessarily dependent upon specific taint or scrofula. The marked increase in the nutrition of children of a syphilitic taint who are suffering from marasmus under the internal use of gray powder and such inunction is most extraordinary.

Arsenic is also of value in anæmic conditions, and may be employed in relatively larger doses than mercury bichloride. Many clinicians have shown the value of this drug in anæmia. Any one of the preparations of arsenic may be employed, and should the anæmia be pernicious in its type, or should it depend upon the disease leukæmia or pseudo-leukæmia, the arsenic must be pushed in ascending doses until marked evidences of its general effects are manifested. Most of the drug, under these circumstances, is in excess, and is cast off in the urine and fæces unused and wasted, straining and irritating the emunctories of the body during its passage through them. Arsenic is of particular merit in those forms of anæmia in which the blood-cells are lacking in number rather than in hæmoglobin.

Arsenite of copper is also a remedy of very considerable value under these circumstances in the dose of from $\frac{1}{100}$ to $\frac{1}{20}$ of a grain (0.0006–0.003) three times a day.

Bullock's blood, fresh or dried and redissolved, may be used by the rectum in the treatment of anæmia in those cases where iron fails, and a change of air and diet may often produce a cure which no drug can bring about.

Diet is an important part of the treatment of anæmia. The food should be good, well flavored, and varied, as well as easy of digestion. It should contain, as far as possible, the remedies needed by the system, such as bone salts, iron, and alkalies, and its ingestion should be accompanied by some red wine, such as port.

At present we are forced to conclude that pathology has not found out the real cause of these troublesome cases, and that until physiology can put its finger upon the most intricate mechanism of blood-making with a positive, clear statement of its function and the physiological chemistry of the manufacture of hæmoglobin, we must remain satisfied to resort to the remedies which experience or common sense tells us will be of value to our patients.

ANAL FISSURE.

This is one of the most painful affections to which man is subject, and requires intelligent treatment, generally by surgical means if the result is to be curative, although great relief can be obtained by the use of drugs.

The most painful and annoying feature of the lesion is the violence of the pain on defecation, which is so severe that any emptying of the bowel is impossible except on rare occasions, when the pain is concentrated in one effort.

To relieve this pain and enable the patient to have a fairly comfortable stool, nothing is so good as an iodoform suppository containing 2 to 10 grains (0.1–0.65) of the drug. Iodoform being a local anæsthetic, the passage takes place almost without the patient's knowledge. If much spasm of the sphincter is present, extract of belladonna, ¼ grain (0.015), may be added to each suppository. For the cure of the fissure a drop of strong carbolic acid may be applied to the spot, and a lotion of tannic acid, glycerin, and water used if hemorrhoids are also present. Ringer highly recommends the application to the fissure, by means of a brush, of a solution of bromide of potassium, 1½ drachms to 1 ounce (6.0 : 32.0) of glycerin. In order that the passages may be soft and yet the patient not be purged, sulphur may be given in the dose of 20 to 40 grains (1.3–2.6) every night, or, if this cannot be used, castor oil may be administered. The best way to give the sulphur is by combining it with powdered cinnamon or aromatic powder.

Sometimes relief is obtained by the use of flexile collodion painted over the fissure.

ANEURISM.

The treatment of aneurism by drugs is, unfortunately, not very successful, but is at least worthy of trial in all cases. Vascular disease resulting in such a lesion depends upon so many causes which may modify the treatment that the history of the case should be carefully considered. The most common causes are syphilis and traumatism, and very often injury is superimposed upon one of the systemic taints. Whatever the cause of the disease may be, iodide of potassium is *par excellence* the remedy most apt to do good, and it will nearly always give relief, even if it does not cure. The doses should be large, 10 to 20 grains (0.65–1.3) three times a day if the patient will bear them, and the prognosis under this treatment is far more favorable if the cause be syphilis than if the disease be idiopathic or traumatic.

For successful treatment the recumbent position must be insisted upon, the patient being kept quiet in bed, changing his position as little as possible and confining himself to the most simple and easily digested diet, with entire avoidance of all stimulating substances either in the way of food or drink. Often it is best to adhere to an absolute milk diet. If the heart is excitable and irregular in its action, the vascular system irritable, and a high arterial tension is present, the circulation must be quieted by small doses of veratrum viride, say 1 or 2 minims (0.05–0.1) twice or thrice a day, but digitalis is not to be employed, since it increases the strain upon the aneurismal sac, although [illegible] the irregular heart beat. Aconite may also be used with [illegible] it is inferior to veratrum viride. If the pain be very great [illegible] is severe, particularly at night—opium is indicated and [illegible] sleeplessness should be allayed, not by full doses of morphine, but by morphine and chloral; or, better still, croton-chloral should be so ordered that the patient receives ⅛ grain (0.075) of morphine and 10 grains (0.65) of croton chloral in pill at bed-time. All attempts to cure aneurism by the use of other drugs, unless syphilis indicates mercury, are useless when the lesion is thoracic or abdominal, and when it occurs in the extremities, as in popliteal aneurism, pressure or surgical measures are to be resorted to as the chief means of cure. If dyspnœa is marked in thoracic aneurism, slight inhalations or "whiffs" of chloroform are sometimes useful.

As we do not know how alteratives act, other than that they govern nutrition, we cannot explain the value of the iodides in cases of non-syphilitic aneurism.

ANGINA PECTORIS.

The exact pathological changes existing in angina pectoris are by no means clearly understood, but without doubt many cases are due to spasm of the blood-vessels, which results in distention of the left side of the heart, which organ is already dilated or enfeebled by disease. Often, too, the coronary arteries have undergone degenerative changes, thereby increasing the cardiac debility. Remedies which ordinarily relieve pain act too slowly or too feebly to be of service in angina pectoris, and even if successful would only relieve the symptom without removing the cause. The indication in the great majority of cases is to relax the vascular spasm, thus relieving the overburdened heart. As first pointed out by Brunton, the nitrites possess this power, and to him belongs the credit of first applying this class of drugs to this ailment. All the nitrites are useful, but the nitrite of amyl and nitroglycerin are the best remedies for the attack itself, and the nitrite of potassium or sodium for the intervening periods or where the paroxysm is prolonged. The reason for this lies in the fact that the sodium and potassium compounds are more stable than the other two compounds, are more slowly broken up in the body, and therefore more prolonged in their effects. In an attack a few drops of the nitrite of amyl should be given by inhalation from a handkerchief, or the nitroglycerin can be used in the dose of 1 drop of a 1 per cent. solution by the mouth. The dose of the sodium and potassium nitrites is 3 grains (0.15) three times a day, but all these drugs are useless unless the arterial tension is high and the heart throbbing or irregular in its exercise of power.

If vascular relaxation is present, they should be supplanted by stimulants, such as alcohol, in full dose, in warm water. Digitalis tincture in the dose of 10 drops (0.65) may be given hypodermically during the attack to stimulate the heart if it is weak, and between the attacks to improve its condition. The writer has found 20-grain (1.3) doses of antipyrin of great service in some cases. Ether given hypodermically is often of service, but Hoffman's anodyne may be used instead of ether by the mouth or hypodermically with better results.

If the nitrite does not relieve the pain, or if it cannot be used because of some contraindication, morphine must be given hypodermically in the dose of ¼ to ½ grain (0.016–0.03), but it should never be given by the mouth under these circumstances, as its absorption will be too slow and its effects will come on after the pain has ceased.

The cure of the patient rests upon the elimination of all causes which can possibly produce a nerve-storm from cardiac irritability, and in the administration of arsenic in full dose for long periods of time. Phosphorus is another remedy which is of undoubted value, and should always be tried in the dose of $\frac{1}{100}$ grain (0.0006) three times a day after meals.

The following is a valuable prescription for use between the attacks:

℞.—Tinc. digital.	♏xlviij (3.0).
Tinc. strophanthi	♏xlviij (3.0).
Nitroglycerini (1 per cent.)	♏xxiv (1.6).
Tinc. cardamomi	q. s. f℥iij (96.0).—M.

S.—Teaspoonful (4.0) three times a day.

The diet should be moderate and easy of digestion, and salads, lobster, and similar articles of food avoided. If the patient is inclined to take exercise of a violent character he must be restrained, but on the other hand some exercise must be insisted on if it is possible.

Tonics, fresh air, freedom from mental worry and avoidance of exposure and cold are also necessary, and running for a car, or performing any act calculated to suddenly increase arterial pressure and cardiac work, is to be avoided.

In that form of angina pectoris occurring in nervous females, sometimes called pseudo-angina pectoris, 1 drachm of ether in ice-water or capsule will often abort the attack, or if the paroxysm is caused by dyspepsia and if the stomach be overloaded, the sufferer may be relieved by the stomach-pump. Between the attacks aconite tincture in the doses of 2 to 3 minims (0.1–0.15) three times a day is useful.

ANOREXIA.

Anorexia is only a symptom of disease, generally associated with debility or other systemic disorder, such as fever or many exhausting diseases.

It is best treated by a careful, well-cooked, and daintily-prepared diet, the use of the bitter tonics, such as gentian, cardamoms, and the mineral acids, or by the use of one of the following prescriptions:

℞.—Acid. arsenosi	gr. ½ (0.03).
Extract. nucis vomicæ	gr. iv (0.3).
Quininæ sulph.	gr. xx (1.3).—M.

Ft. in pil. No. xx.

S.—One t. d. after meals.

Or,

℞.—Acid. hydrochlorici dil.	f℥ss (16.0).
Tinct. cinchonæ comp.	f℥vj (192.0).—M.

S.—Dessertspoonful (8.0) three times a day, after meals, well diluted with water.

(For the use of other bitter tonics see Calumba, Quassia, Chamomile, Cardamom, and Nux Vomica. None of these drugs are suitable if there is any acute irritation or inflammation of the stomach or intestines. (See Indigestion.)

APOPLEXY.

When a person suffers from a stroke of apoplexy, the chief aim of the physician must be to lower the blood-pressure if it be high, and so to decrease the intracranial hemorrhage, and, as the blood-pressure is nearly always excessive under these circumstances, its reduction may be considered as a routine treatment if the patient is seen very soon after the onset of the attack. If the person be full-blooded, copious venesection is to be employed upon any one of the veins in the arm on its anterior surface. (See Venesection.) At least 1 pint (500 cc.) of blood should be withdrawn and the condition of the pulse carefully noted. If bleeding is impossible, veratrum viride or aconite must be used to lower blood-pressure, the latter in full dose, 5 drops (0.35) of the tincture. Hot mustard plasters must be applied to the feet, or a hot mustard foot-bath be used if this is practicable. Ice in an ice-bag or wrapped in a towel may be applied to the head. If vomiting comes on care must be taken that the stertorous breathing does not draw into the lungs particles of the half-ejected food. Sometimes croton oil, 1 drop (0.05), placed on the tongue with 5 drops of sweet oil, may cause a depletant catharsis which will relieve cerebral engorgement, or $\frac{1}{6}$ grain (0.01) of elaterium may be used. The head must be kept high and the feet low down. These are the methods to be used immediately after the rupture of the blood-vessel.

The object to be sought, after the "stroke" has occurred and the hemorrhage has ceased, is the removal of the extravasated blood, the restoration of function in the paralyzed parts, and the prevention of secondary lesions consequent upon inflammation of the brain as a result of the injury to its substance. If the patient survives the attack, no drugs should be used save arterial sedatives for one or two days, until the clot in the ruptured vessel has become firmly fixed, unless symptoms of meningitis arise, when these drugs must be pushed if the pulse is tense, and opium and calomel administered in small antiphlogistic doses, $\frac{1}{4}$ grain (0.016) of each every four hours. Meningitis and cerebritis rarely occur if the veratrum viride or aconite is properly used. After the clot has firmly formed and has plugged the blood-vessel, we may proceed to take measures for the absorption of the exudate, the chief measure consisting in the use of iodide of potassium in as large doses as the patient will bear without the production of iodism. This drug should not be resorted to until several days, or even two or three weeks, have elapsed after the attack. Mercury in small doses may also be given.

In order that the muscles of the extremities may not waste and become powerless from disuse, passive exercise, rubbing, and, if possible, massage, must be resorted to. Electricity may be applied to them in the form of the slowly-interrupted current, and strychnine may be used hypodermically or by the mouth as a stimulant to the trophic centres in the spinal cord. None of these measures are to be employed if any inflammation exists in the brain, as they will increase the cerebral disorder, and at least three weeks should elapse after the attack before they are resorted to. (See Strychnine.)

Electricity applied to the head to remove the lesion is useless, as the current does not go through the brain, but around the skull by means of the scalp.

A very careful diet is to be maintained. Meats are to be used very sparingly, the bowels maintained in perfect regularity, and no wines are to be taken nor any stimulants used, lest they cause a second rupture of the weakened vessel in the brain.

Apoplexy must be carefully differentiated from acute alcoholism and opium poisoning, which it much resembles. (See Alcohol.)

If respiration fails, nothing can be done with much advantage, but belladonna or strychnine may be given hypodermically. The use of electricity to stimulate the phrenic nerve and diaphragm when respiration fails is a remnant of senseless medical practice, and is particularly useless in apoplexy. (See Asphyxia.)

Above all things, stimulants are contraindicated during the acute attack, even though the pulse fails, as they increase the hemorrhage into the brain.

APPENDICITIS.

It is to be remembered that many cases which years ago would have been called idiopathic peritonitis are now recognized as arising primarily from inflammation of the appendix vermiformis. For this reason it is incumbent upon every physician who is called to see a case of severe abdominal pain with symptoms of peritonitis or appendicitis to carefully examine into the condition of the appendix. No routine treatment for appendicitis can be followed, as each case possesses distinct individuality. There are many surgeons, holding extreme views, who assert that the mere presence of appendicular inflammation for a few hours renders an extirpation of this organ necessary. On the other hand, there are doubtless many cases in which the physician postpones consultation with a surgeon until it is too late to save the patient. All cases of appendicitis may be divided into three classes: First, those which are fulminating or gangrenous, and almost invariably result in death whether treated medically or surgically; second, those which need surgical interference; and third, those which undoubtedly get well, some of them permanently so, under proper medical treatment. With the first class we shall not deal, for obvious reasons. In all cases of acute appendicitis of the third class which we have named the method to be followed is briefly as follows: The patient is to be put to bed and absolute rest on the back insisted upon. He must not rise to the sitting posture even for defecation or urination. An ice-bag is to be placed over the appendix, or, if this cannot be done, leeches may be applied in this region. The bowels may be moved by half to one ounce of magnesium sulphate or citrate of magnesium in its official solution, but it is far better to unload the colon by rectal injections. After the bowels have been moved, sufficiently large doses of opium or morphine are to be given to relieve pain and act as an antiphlogistic. The doses should be of such size as to "take the edge off the pain," but they must not stupefy the patient, so that he fails to give clear answers to questions. If in spite of this treatment there is persistent tenderness in the right iliac region, with increase in the area of dulness on percussion over the appendix, and a sense of deep-seated tension exists, then a surgeon should be at once called in—not, necessarily, to operate, but to decide as to the advisability of an operation, and to perform it if it is considered a wise procedure. Generally, it is best to postpone surgical interference in mild cases until after the acute attack is over, but this preference is to be waived in pressing cases, when there is rigidity of the belly and great pain.

In the second class of cases which we have named the treatment is too largely surgical to be considered in a book devoted only to medical therapeutics. It is unnecessary to give a purgative before the operation, unless we think the bowel contains undigested food, since the *caput coli* never contains fæces in any quantity, and furthermore, in those fairly severe cases which demand operation at once the possibility of perforation of the appendix, with escape of the contents of the bowel into the peritoneal cavity, is always to be remembered, for if perforation has occurred the purgative will force the fæces out through the patulous appendix.

Instead of a milk diet, the patient should receive a diet of broths or beef-tea, since the casein in the milk is apt to cause fermentation and the formation of gas in large amounts in the intestine, thereby causing distressing tympanites.

If attacks of appendicitis are recurrent, the appendix should be removed in an interval of quiescence. (See Article on Peritonitis.)

ASPHYXIA.

When practising artificial respiration in cases of asphyxia Sylvester's method should always be employed. This consists of laying the patient on some hard, flat surface, kneeling above his head, and then, after grasping the arms at the elbows, bringing them upward and outward, so that they follow the plane on which the body is extended. This movement causes expansion of the chest, or *inspiration*. After a moment's pause the arms are lifted up and brought toward one another, and then, while still approximated, pushed down to their original position upon the floating ribs, upon which they are pressed. This last movement drives out the air from the chest, or causes *expiration*. These movements should be at the rate of from sixteen to twenty per minute, about that of normal respiration, and be persisted in for at least forty-five minutes, even though the case seems hopeless, as cases have recovered after as long a period of apparent death as an hour. While these movements are being carried on, the patulousness of the upper air-passages is to be maintained.

In some researches made by Dr. Martin and the writer the following rules regarding the position of the head, neck, epiglottis, and tongue were formulated: The fingers are passed behind the angles of the lower jaw and the latter is pressed forward; this elevates the epiglottis and the base of the tongue about a quarter of an inch from the post-pharyngeal wall. Extending the head and pushing it forward so that the neck makes an angle of forty-five degrees with the plane of the table draws the base of the tongue and the hyoid bone far forward, this motion being at the same time imparted to the epiglottis, so that the latter stands upright and is separated from the posterior wall of the pharynx by an interval of about an inch. By tightly closing the jaw the antero-posterior space is still further increased.

The epiglottis may prevent free entrance of air to the lungs, even though the tongue is pulled forward. Any means which accomplishes the anterior projection of the hyoid bone immediately and infallibly raises the epiglottis and the base of the tongue, and the hyoid bone may be made to project anteriorly by direct pressure upon its cornua, by direct pressure or traction applied to the tongue far back behind the anterior half arches of the palate, and by the action of gravity in the abdominal decubitus, or by extension of the head upon the neck, although flexion of the neck with extension of the head upon the neck does away with the epiglottis as an obstructing factor as completely as any other posture.

A very useful method in treating asphyxia is Laborde's method by rhythmic traction of the tongue. The tongue is grasped with forceps and pulled well forward and upward from ten to fourteen times a minute until voluntary respirations occur. The sensory nerves of the tongue carry impulses to the phrenic centre, which in turn causes the diaphragm to contract. A very large number of recoveries from apparent death as a result of its use renders this method most worthy of trial.

The absurdity of the application of the rapidly-interrupted electric current to the phrenic nerve is not alone dependent upon the points we have named. (See Ether.) It has recently been proved by careful observation on the part of Dr. Martin and the author that the application of the electrode over the phrenic nerve in the neck may cause cardiac arrest through diffusion of the current to the vagus nerve, and Griswold reached conclusions of an identical character in 1885.

If electricity is used, it should be employed solely as a peripheral irritant, with the object of arousing the patient, as would a dash of cold water.

ASTHENOPIA.

Asthenopia, or weak sight, depends upon exhaustion of the power of accommodation in cases of refractive error, usually hypermetropia, or upon insufficiency of the external ocular muscles. The former is sometimes called *accommodative asthenopia*, and the latter *muscular asthenopia*. The treatment of these conditions requires the prescribing of the proper pair of glasses, combined, if necessary, with prisms and with systematic exercise of the ocular muscles. Locally, a weak solution of the sulphate of eserine or pilocarpine acts as a stimulant to the ciliary muscle, and internally good results follow the use of large doses of the tincture of nux vomica or strychnine.

℞.—Eserinæ sulph. . . . . gr. $\frac{1}{30}$ (0.002).
Aq. destill. . . . . f℥j (32.0)—M.
S.—2 drops (0.1) night and morning.

Or,

℞.—Pilocarpin. nitrat. . . . . gr. $\frac{1}{20}$ (0.003).
Aq. destill. . . . . f℥j (32.0).—M.
S.—2 drops (0.1) night and morning.

Another form of asthenopia is termed *neurasthenic asthenopia* or *retinal anæsthesia*, and presents a number of eye-symptoms in connection with a general depression or debilitated state of the nervous system, the eye itself, however, being a healthy organ. The chief symptoms are fluctuation in visual acuity, rapid disappearance of objects looked at, contraction of the field of vision, imperfect retinal images, often associated with dread of light. The mere prescription of glasses in these cases to correct any refractive error is not sufficient. Much relief will often be obtained if hot compresses at 110° F. be made to the closed eyelids for five minutes at a time. The patient requires the same general treatment that would be applied to any neurasthenic case. All the functions of the body must be carefully examined into and placed in as normal a condition as circumstances will allow. Especially valuable are rest, massage, salt baths, and full doses of strychnine, together with iron if there be anæmia.

ASTHMA.

Asthma is one of the most difficult diseases to successfully treat that the physician has to deal with.

The disease in all its forms depends upon interference with the free entrance and exit of the air to and from the lungs, and this is generally, if not always, dependent upon a spasm of the muscular fibres in the walls of the bronchial tubes, although it has been asserted to be due to a sudden swelling or hyperæmia of the bronchial mucous membrane. Both of these states are probably present in varying degree in all cases

The spasm has been proved by Longet, Williams, Romberg, Paul Bert, Bierner, and very recently by Sandmann, to be due to a neurosis of the pneumogastric or vagus nerve, while the swelling of the mucous membrane has been seen by Stoerk and others. This has formed two schools of teaching concerning the pathology of this disease, when a little attention to the physiology of the subject would at least show that no difference need exist, the vagus nerves governing not only the muscular fibres, but also the blood-vessels of the bronchial tubes. The discovery of Michaelson that injury of the recurrent laryngeal nerves causes catarrhal inflammation of the bronchial tubes, particularly those of the upper lobes, renders the analogy between acute asthma and laryngeal spasm which has been spoken of by many writers still more interesting.

One other step remains for a thorough understanding of the manner in which the disease is produced. Gastric, dyspeptic, or intestinal asthma arises from indigestion, as its name implies, and is caused by the irritation of the afferent filaments of the vagus in the walls of the stomach and intestine, thereby causing reflexly a contraction and hyperæmia of the bronchial tubes. In a similar reflex manner hypertrophies of portions of the nasal chambers or abnormal conditions of the nasal mucous membranes in general may result in an asthmatic attack.

Having obtained some idea of the cause of an attack, let us turn to the treatment of the affection.

By far the most serviceable remedy in asthma is belladonna, which, as has been pointed out when that drug was studied (see Belladonna), exercises in medicinal dose a decided sedative and depressing influence on the peripheral filaments of the vagus nerves, not only so far as the heart is concerned, but also, through the pulmonary fibres, upon bronchial secretion, which is always diminished by the drug, probably by this vagal influence.

It is evident, therefore, that the use of belladonna or atropine, although originally employed in an empirical manner, rests upon a rational basis, and as the physiological action of stramonium, hyoscyamus, and similar members of this group is nearly identical with belladonna, their influence for good is also explained. The experiments of Ott prove that lobelia is a peripheral pneumogastric depressant, and those of Rosenthal and the author likewise showed that tobacco has a similar effect. The same is also true of nitrite of amyl and the other nitrites, which also relax unstriped muscular fibre. We have before us, therefore, a list of the most efficacious and best antiasthmatics, all of them being depressant to the peripheral vagi.

The other remedies commonly employed are chloroform by inhalation, which relaxes the spasm of muscular fibre by its local influence, and morphine, which acts as a nervous sedative, prevents reflex irritation, and quiets the patient, acting at the same time as a heart stimulant and unloading the engorged cardiac cavities. The relief obtained by the inhalation of the fumes of nitrate of potassium, Sée asserts, depends upon the formation of the protoxide of nitrogen and carbonic acid gas, which act as local anæsthetics.

The practical treatment of an attack of asthma consists in the use of morphine hypodermically in the dose of $\frac{1}{6}$ to $\frac{1}{4}$ grain (0.01–0.015), alone or in combination with atropine. Cigarettes made of paper soaked in a solution of nitrate of potassium and belladonna may be smoked (see formula under Belladonna), or they may be made in the following manner:

℞.—Foliorum belladonnæ	gr. vj (0.36).
Foliorum hyoscyami	gr. iij (0.2).
Foliorum stramonii	gr. iij (0.2).
Extracti opii	gr. $\frac{1}{4}$ (0.015).
Aquæ lauro-cerasi	q. s.—M.

These various leaves are broken up like commercial tobacco, and moistened by adding the cherry-laurel water, which should contain the opium. Finally, a whole leaf soaked in the same fluid is used as a cover, or a piece of cigarette paper may be employed in the same manner.

In some cases a very useful treatment is the smoking of nitre-paper cigarettes, which are prepared, before rolling, not only by soaking the paper in a solution of nitrate of potassium (see Nitrate of Potassium), but also by dipping them, after drying them, in tincture of belladonna or stramonium, and allowing the alcohol to evaporate from the paper while it is hung in the air.

A remedy very recently brought forward in this country for the relief and cure of asthma is euphorbia pilulifera, the fluid extract of which may be given in the dose of ½ to 1 drachm (2.0–4.0) once, twice, or thrice a day. (See Euphorbia Pilulifera.)

The author finds the following formula very useful in asthma:

℞.—Sodii iodidi	gr. ij (0.1).
Potas. bromidi	gr. ij (0.1).
Ext. euphorbiæ piluliferæ fl.	♏iij (0.15).
Nitroglycerini	gr. $\frac{1}{200}$ (0.0003).
Tr. lobeliæ	♏ij (0.1).—M.

Ft. in pil. vel capsul. No. i.
S.—From 1 to 4 three times a day.

It will be seen that each ingredient of this pill has a different action. The action of iodides in asthma is well known, as is also that of the bromides. The euphorbia pilulifera has been found useful in asthma empirically. The nitroglycerin depresses the peripheral ends of the vagus nerves, and acts as a stimulant to the heart when engorged with blood by removing the inhibitory action of the vagus and relieving the blood-vessels elsewhere. The tincture of lobelia acts as a depressant to the vagus also.

A valuable prescription for asthmatics, to take between the attacks, particularly in those cases which have cardiac symptoms, is the one calling for digitalis, strophanthus, and nitroglycerin in the article on Angina Pectoris.

Sometimes a strong cup of coffee taken at the beginning of a paroxysm will abort it.

The use of amyl nitrite by inhalation, 3 to 6 drops (0.15–0.4) on a handkerchief, is invaluable in many cases, and it rarely fails to relieve the spasm. Owing to the engorgement of the heart consequent upon the embarrassment of respiration, this nitrite must be used with care, and in one or two instances it has proved dangerous by causing cardiac failure.

Sometimes tobacco may be smoked, and it is particularly efficacious in those who are not accustomed to its constant use.

Lobelia when employed should be used in full emetic dose (1 drachm [4.0]) in the form of the tincture if an attack is imminent. If an attack is feared, 10 drops (0.65) of the tincture every four hours may be given if the heart is in good condition.

A treatment of asthma which is very successful when it arises from nasal disorder consists in the application to the nasal cavities, at the onset of the attack, of the following solution by means of a brush or spray:

℞.—Cocain. hydrochlorat. . . . . gr. xv (1.0).
Aquæ destillat. . . . . q. s. ad fʒiv (16.0)—M.
S.—Apply as directed.

If this solution is thoroughly applied and the other directions given are carried out, very rapid relief will often be obtained. Unfortunately, we cannot readily separate those cases which are due to nasal disease and those produced by other causes, and in consequence this treatment when tried for the first time in a given case is purely experimental.

The curative treatment of asthma to a very large extent rests upon the use of iodide of potassium, and in the careful regulation of the diet and bowels, particularly if the trouble seems to be dependent upon indigestion. As the attacks are generally nocturnal, the evening meal should be taken early, be light and easily digested, and tea and coffee should be avoided at this time. The patient should avoid dusty streets and live in the open air as much as possible, and a damp atmosphere is usually preferable to a dry one, provided it is not too cold. This rule is subject to many variations, and each case will be found to be a law unto itself. Each patient must try different climates until the proper one is found. Arsenic may be used, particularly if the mucous membranes are below par, and a dose of bromide of potassium or sodium, 30 grains (2.0) half an hour before retiring to bed, may be of service.

Grindelia robusta is largely used as a prophylactic in the dose of 10 to 30 minims (0.65–2.0) of the fluid extract three times a day. Lobelia may also be used in the form of the tincture, 10 drops (0.65) three times daily.

The use of compressed and rarefied air is sometimes of service. Inhalations of oxygen are valuable if the cyanosis is extreme.

In many cases the greatest relief will be given by the use of the bronchitis tent. (See Bronchitis.)

In those cases in which the presence of nasal polypi or other irritations of the air-passages is the provoking cause of the attacks those causes must be removed before a cure can be attained. In other instances arsenical wall-papers are the cause of the trouble. In all cases of asthma the physician should from time to time examine the urine and the heart.

BED-SORES.

Bed-sores depend upon disturbances of nutrition resulting from pressure exercised in such a manner that the local circulation is interfered with at a time when the vitality of all of the tissues is depressed by disease or injury. In most instances the part involved becomes chafed by creases in the sheets, by crumbs of food, or by moisture from the discharges of the rectum and bladder.

The chief thing to be done is to prevent the trouble by careful nursing and cleanliness, which must be supplemented by measures devoted to the hardening and improving of the skin covering the parts where the sores are apt to appear, as over the buttocks and sacrum. To permit of a good supply of blood, the patient should be turned on one side or the other every few hours and the skin of the part which has been pressed upon rubbed thoroughly with a dry towel to cause a healthy transudation and absorption of the nutritive juices. Salt and whiskey, 2 drachms (8.0) to the pint (500.0), may be rubbed over the skin, and tincture of catechu or the dilute solution of the subacetate of lead applied to harden it. If this is not used, a mixture of alum and spirit of camphor is useful, made by adding 1 ounce (30.0) of powdered alum to the whites of 4 eggs and mixing this with 2 ounces (64.0) of the camphorated spirit. Where the skin is very red and angry-looking, but still intact, a solution of nitrate of silver of the strength of 20 grains to 1 ounce (1.3 : 32.0) is to be thoroughly painted over the spot. All these remedies act in hardening the skin through their astringency, or by acting as sedative astringents to the inflamed capillaries of the part.

When a bed-sore is developed measures must be taken for its cure and the prevention of its spread. With this object in view the body must not rest on the part affected if this can possibly be avoided, and in order that the sore may be protected and the pressure equalized, a large piece of soap-plaster, with its edges deeply incised to make them pliable, should be applied after the sore has been thoroughly washed out by means of a swab or syringe filled with a 1 : 5000 solution of bichloride of mercury, and afterward dusted with iodoform. Sometimes large squares of lint heavily covered with zinc ointment are serviceable in lieu of the soap-plaster. If the sores spread and burrow through the parts, the sinuses should be freely opened and irrigated with peroxide of hydrogen, all dead tissues being cut away to avoid sepsis.

Nitrate of silver in the strength of 20 grains to ounce (1.3 : 32.0) may also be used locally as the patient recovers if the ulcers seem sluggish. A *smooth* slip-sheet should always be placed under the buttocks. If possible, supportive measures and an increased amount of predigested food should be given if the sloughs are large. The internal use of iron is particularly valuable in the form of the tincture of the chloride in full doses (say 20 drops [1.3]) every four hours.

BILIOUSNESS.

This is a term used to designate a state which presents different symptoms in different cases, but always includes languor, headache, or dizziness, perhaps some yellowing of the skin and conjunctiva, and a general sense of atony, mental depression, and discomfort. It depends not upon an excessive secretion of bile, but upon some perversion of the functions of the liver or the retention of bile in the bile-ducts. Further than this, most of the symptoms do not depend directly upon the changes in the bile, but upon failure of proper digestion in the stomach and intestine, coupled with the development of irritative decomposition-products of various kinds. The stomach, intestine, liver, pancreas, and their juices all form a complex interwoven chain of function in which if one link breaks the entire chain becomes disturbed. The entrance into the stomach of certain food-stuffs which are either ill prepared or improper for gastric digestion rapidly causes the development of active fermentation, with the formation of lactic and butyric acids, which irritate the gastric mucous membrane, and thereby bring about a faulty gastric secretion of mucus, which makes still further trouble. By the same means the circulation of the stomach is disturbed and becomes abnormal, and the intestine, liver, and pancreas receive reflex irritation to which they are not normally exposed. Further than this, the irritated stomach fails to convert its contents into peptones and the general features of chyme, and too early or too late drives out into the duodenum a mass of semi-digested and fermenting material utterly unfit for intestinal digestion and absorption, thereby disordering the functions of these parts still further at a time when they are not prepared for the reception of any food. The secretion poured out by the different glands varies from the normal; the alkaline juices are not able to overcome the normal acid of the gastric juice plus the lactic and butyric acids; and finally the reaction of the intestine becomes acid instead of alkaline, with resulting irritation and secretion of morbid juices and mucus. The trouble when existing in the stomach gives rise to headache and discomfort, a bad taste in the mouth, and perhaps pain, and is followed by fever, languor, jaundice, and flatulence when the intestine is affected. The cause of these symptoms rests upon the fact that, while gastric juice and bile are antiseptic, pancreatic juice mixed with food undergoes rapid decomposition, with the development of products of decomposition, such as skatol and indol and a large number of poisonous alkaloids. Normally, these are not allowed to form, owing to the presence of antiseptic bile, which also hurries on the absorption of the food; but if the bile is retained in its ducts, its secretion is impaired and its constitution altered by the disorder of the liver which results reflexly from the gastric and intestinal irritation. Unfortunately, the complication does not cease at this point, for the liver in health has other functions to fulfil, one of the most important of which is the arrest and destruction of all poisons of an organic character which come to it from the stomach and bowel. Not only are decomposition-products destroyed by it, but all the vegetable alkaloids are rendered innocuous if present in ordinary amounts.[1] The disorder of hepatic function, therefore, permits the entrance into the general circulation of these substances, which are very various as regards their powers and effects. Thus, Brunton has pointed out that one of these compounds closely resembles curare, in that it poisons the peripheral ends of the motor nerves, and thereby is at least partly responsible for the muscular relaxation and languor often seen in patients suffering from so-called "biliousness." Other substances act as do digitalis, atropine, muscarine, and picrotoxin, and the number of these various compounds is infinite.[1]

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[1] See studies of Schiff, Lautenbach, and many others, including Ludwig and Schmidt-Mulheim.

It is impossible to give space to a further consideration of these poisons, but what has been said shows clearly that "biliousness" only expresses a state in which absorption of the bile is not the sole cause of the symptoms, but that other poisons are at work. The methods of treating biliousness are therefore not to be considered as depending upon some regular routine, but upon a study of the case and its symptoms.

Very frequently, after several days of minor discomfort, the disorder culminates in a severe sick headache, after which vomiting comes on and relief is obtained almost at once. Such patients can generally be relieved in the very first part of their discomfort by emetic doses of ipecac or apomorphine, 30 to 60 grains (2.0–4.0) of the former, or $\frac{1}{15}$ grain (0.004) of the latter hypodermically. The manner in which this treatment does good is very evident. It compresses the liver and expels inspissated bile by the compression exercised by the abdominal walls and diaphragm in the effort of vomiting, and thoroughly excites to normal secretion the torpid glands of the stomach and intestine.

The vomiting also rids the stomach of the fermenting masses and bacteria contained in them, and renders the alimentary canal more pure. This purity may be increased between the paroxysms of vomiting by draughts of warm water or water containing a few grains of bicarbonate of sodium or salicylic acid.

When it becomes evident that an attack is about to begin—that is, when constipation, slight drowsiness, or languor after meals shows the tendency present—one of two drugs should be used, either podophyllin if the stools be dark, or calomel if they be light-colored: $\frac{1}{6}$ grain (0.01) of the former to an adult is generally enough, or 1 grain (0.05) of calomel divided into six powders, one of which is to be taken every fifteen minutes, is a good dose, to be followed in four hours by a saline. If the attack is sudden in its onset, no time is allowed for these hepatic stimulants, and a saline should be used in a good-sized dose at once, not because it causes a flow of bile, but because it sweeps the poisonous matters out of the gut before complete absorption can occur, and aids in restoring the normal intestinal alkalinity.

The prevention of "biliousness" depends upon the maintenance of a normal, easily digested diet, upon the formation and excretion of normal bile, and the prevention of fermentation and decomposition in the alimentary tract.

The term "normal diet" is a very elastic one, and varies with each case. While certain forms of food are generally considered good or bad, easy of digestion or difficult of assimilation, it nevertheless remains a fact that many of the simplest foods are capable of acting as poisons in susceptible persons. A large number of persons cannot take milk or eggs because their digestion of these substances is faulty, and the writer is cognizant of one case where lobster salad can be eaten at bedtime without discomfort, while an egg at breakfast will cause a severe headache or pain in the belly. Rules as to diet must not be "iron-clad," but based on observation.

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[1] See the researches of Schweringer, Zuelzer and Sonnerscheim, Bence Jones, Dupré, Körch and Fassbender, Brieger, Schmiedeberg, and Harnach.

By far the best means of maintaining hepatic activity in cases where this organ is torpid is horseback exercise, particularly if the exercise is taken on a trotting horse, as the jolting of the liver keeps the chain of digestive functions active and prevents the secretions from becoming clogged. Along with this exercise massage of the hypochondrium and belly-walls is useful, and the movement of stooping over, bending from side to side, and bending backward with the feet close together, is of value. Coffee is often the cause of biliousness because of its oil.

The use of pure, dark orange-colored, undiluted nitromuriatic acid in these cases in the dose of 3 drops three times a day in half a tumblerful of water is invaluable, and the fluid extract of stillingia in the dose of 20 drops (1.3) is of service, as is also the solid extract of euonymus in the dose of 3 grains (0.15). 5-grain (0.35) doses of extract of chirata in pill are also useful in hepatic atony of a mild type.

℞.—Ext. chiratæ	gr. xl (3.0).
Podophyllin	gr. iv. (0.2).
Euonymin	gr. viij (0.5).
Leptandrin	gr. viij (0.5).
Creosoti	gr. x (0.65).—M.

Ft. in pil. No. xx.
S.—One pill every night.

The knowledge of the action of many of the poisonous materials formed in the alimentary canal renders it possible for us to relieve the patient by other means than those which may be generally resorted to when the attack is present. Thus, if the pupils are dilated, the skin hot and dry, the eyesight dim, and the pulse rapid, the alkaloid producing these signs of atropine poisoning may be antagonized by opium in small dose, or if the pulse be slow and full, the arterial tension high, and there is throbbing in the head with frontal headache, the alkaloid representing digitalis may be antidoted by the use of aconite. If nervousness and irritation are present, the bromides and chloral may be used.

For some unknown reason the use of caffeine in the headaches of biliousness nearly always makes them worse, particularly if the headache is due to over-indulgence in coffee.

If the face is flushed, a mustard plaster or cup to the nape of the neck may be used, and a hot foot-bath is often of service.

In cases where the bilious attacks are associated with catarrh of the stomach, intestines, or bile-ducts, chloride of ammonium, in 5-grain (0.3) doses, three times a day, is very useful, as is also the protiodide of mercury, when triturated with sugar of milk, in the dose of $\frac{1}{60}$ to $\frac{1}{40}$ of a grain (0.001–0.0015) three times a day. Frequently the use of salol or salophen in 10-grain (0.65) doses, three times a day, does much good in these cases, acting as an intestinal antiseptic. (See Salol.)

BLEPHARITIS.

Blepharitis is divided clinically into an ulcerative and non-ulcerative variety. The indication of prime importance in the treatment of this affection is the removal of the scabs and crusts before the application of the local remedies. This may be accomplished by the use of alkaline solutions, bicarbonate of sodium or biborate of sodium (8 grains to the ounce [0.6 : 32.0]), or a 5 per cent. solution of chloral, as recommended by Gradle. The salves that have met with the greatest success are Pagenstecher's ointment (yellow oxide of mercury, 1 grain [0.05], vaseline 1 drachm [4.0]), dilute citrine ointment, pyrogallic-acid ointment, or a 3 per cent. milk-of-sulphur ointment, to which resorcin may be added. The latter application is useful in the squamous variety alone. In the ulcerated form, if the crusts are tenacious, these, as well as the stunted cilia, must be removed with forceps, and yellow-oxide-of-mercury salve or some similar application applied. Excellent results follow touching the crater-like abscesses which exist in edges of the lid with nitrate of silver. If there is an accompanying conjunctivitis, a boric-acid solution is suitable, while under any circumstances obstruction of the lachrymal duct —a frequent accompaniment of the disease—must be removed, and the nasal passages explored for any chronic inflammatory condition. The relation between this disease and the presence of refractive errors demands the correction of the later, should these exist, before a hope for cure may be entertained.

BOILS.

Boils are dependent upon an impoverished state of the system, or, more rarely, on some local trouble situated in the skin, as in the persons of oil- or paraffin-workers.

Their constitutional treatment rests upon the use of fresh air, cod-liver oil, iron, arsenic, phosphate of sodium, and, if any boils are present at the time, the use of the sulphurate of calcium in the dose of $\frac{1}{10}$ grain (0.006) every five hours. The sulphurate of calcium hastens the maturation of boils and prevents the formation of new ones, but is useless, according to its original user, Dr. Ringer, in the boils which appear during the course of some cases of diabetes.

The local treatment of boils may be divided into the abortive and curative methods. The abortive method consists in painting the inflamed spot, when the trouble first begins, with a solution of gun-cotton (collodion), and renewing the coat hour after hour until a heavy contractile covering is formed. If pus forms under this, it may be absorbed, but if this does not occur, then the boil must be opened under antiseptic precautions and properly dressed. A strong solution of nitrate of silver is also very useful at the very beginning of the formation of a boil if painted over the part in the strength of 20 grains to the ounce (1.3 : 32.0). The other local applications consist in the use of the extract of opium or belladonna over the part to relieve pain and decrease the inflammation.

Poultices may also be used to relieve the sensation of tenseness and mature the boil, and should contain sweet oil and laudanum. Ringer recommends the application of alcohol and camphor over the skin in the early stages. After the skin is wiped dry it is to be smeared with camphorated oil. Stelwagon uses the following:

℞.—Ichthyol	ʒj (4.0).
Emplast. plumbi	ʒij (8.0).
Emplast. resinæ	ʒij (8.0).—M.

S.—Apply to the part.

He also approves of the injection of a few minims of a 5 per cent. solution of carbolic acid into the apex of the boil if its formation is assured.

BREASTS (INFLAMED).

Mastitis is, from a medical point of view, readily treated. Lactation should at once cease, and the breast be dressed by the use of a sponge compress, underneath which belladonna ointment is to be copiously smeared. Belladonna is a useful remedy both before and after very acute inflammation has begun, and its use should be persisted in for twenty-four hours.

At the same time that these measures are resorted to, the circulation should be thoroughly impressed by aconite or veratrum viride, and mild saline purges should be given. If the milk persists in forming, it must be removed by the breast-pump. For the surgical treatment of mastitis the reader should refer to books on surgery.

BRONCHITIS (ACUTE AND CHRONIC).

In the early stages of bronchitis there is always present a very distinct hyperæmia, followed by a true inflammation of the mucous membrane lining the bronchial tubes. When these changes are confined to the larger bronchi, the term "bronchitis" is employed, but when the minute bronchioles are invaded, the disease is known as "capillary bronchitis." In the article on Pneumonia and elsewhere in this book the writer has spoken of the various stages of inflammation, the measures indicated under such circumstances, and has described the action of the various drugs. In many cases the physician only sees the patient when the second stage of his disease is present, but if the individual presents himself at once, the following history and physical signs will indicate the treatment to be employed: After exposure, more or less severe, to wet, dampness, or dry cold, a sensation of oppression comes on, associated with a feeling of "tightness across the chest" or a sensation as if a bolus of food was under the sternum. Aching and pain may then be traced over the lines of the bronchial tubes, while the dry hacking cough increases the discomfort and seems to strain the tubes till each one can be outlined on the chest-wall by the patient. The cough, when it occurs, is virtually unproductive, and often hurts the larynx and throat. On making a physical examination by auscultation there will be found over the posterior aspect of the chest, between the shoulder-blades, sounds of bronchial breathing, which are rougher than normal, and due to the air passing over an inflamed, swollen, and roughened mucous membrane. This bronchial roughening may be sufficient to cause a harsh inspiratory sound over the entire chest, and the expiratory sounds may be heard a little louder than usual. No other changes from the normal can be noted, but isolated spots of discomfort may be pointed out by the patient where aches, "catches," or "kinks" seem to be present in a previously normal tube. Percussion, palpation, and inspection show nothing more of note. Some fever may be present.

The patient should receive a hot foot-bath, take a glass of hot lemonade with a little whiskey in it, and go to bed at once, in order that by inducing a profuse perspiration he may relieve the bronchial congestion. Often a dose of Dover's powder is useful in hearty adults to aid in causing perspiration. In children the chest should be well rubbed with camphor liniment and a little tincture of aconite be given in water with sweet spirit of nitre every hour, as follows:

℞.—Tinct. aconit. . . . . ♏viij (0.6).
Spt. æther. nitros. . . . . f ʒij (8.0).
Aquæ . . . . q. s. ad f ℥j (32.0).—M.
S.—A teaspoonful (4.0) to a child or a dessertspoonful (8.0) to an adult in water every hour.

In many adults 5 to 10 grains (0.30–0.65) of Dover's powder with a hot drink is better.

If the attack is not aborted, while the first stage is still present, before secretion is established, resort should be had to ipecac and to citrate or acetate of potassium, which act as sedatives to the inflamed mucous membranes and aid in the formation of secretion, moistening the inflamed surfaces and thereby overcoming the dryness and irritation. These potassium salts also act as febrifuges, and should be used in full doses, as much as 40 grains to 1 drachm (2.6–4.0) in a day, in addition to the aconite already recommended. The following prescription illustrates their employment:

℞.—Syrupi ipecac. . . . . fʒj vel fʒiij (4.0–12.0).
Potassii citratis . . . . ʒiv (16.0).
Aquæ destillat. . . . . . . q. s. ad f℥vj (192.0).—M.
S.—Dessertspoonful (8.0) every four hours for a child of five years.

Or,

℞.—Syrupi ipecac. . . . . f℥ij (64.0).
Succi limonis . . . . f℥j (32.0).
Potassii carbonatis . . . . ʒiv (16.0).
Spirit. æther. nitrosi . . . . f℥j (32.0).
Aquæ destillat. . . . . q. s. ad f℥vj (192.0).—M.
S.—Dessertspoonful (8.0) every four hours for an adult. This mixture should not be corked for some time after it is made.

For a child this prescription should be reduced just one half in each part with the exception of the water.

capsules may be resorted to with great success. If capsules cannot be supplied, terebene may be made into an emulsion with acacia or tragacanth and given in this way. Sometimes terebene will irritate the kidneys and produce a sense of weight across the loins; if this occurs its use should be stopped. In other cases it will disorder the stomach or cause diarrhœa. These effects are not, however, commonly seen. Terpine hydrate in 10-grain (0.65) doses may be used three times a day, or terpinol in the dose of 8 to 10 grains (0.5–0.65) in capsules or pills. Certain of the volatile oils and resins are also of value at this time, notably the oleoresin of cubebs and copaiba, which, however, possess the disadvantage of disordering the stomach. The oil of eucalyptus is also of great value, and may be given in capsule or emulsion in the dose of from 1 to 5 drops (0.05–0.35) every five hours. The oil of sandalwood in the dose of 5 to 10 minims (0.35–0.65) is very valuable, and is not so apt to disorder the stomach, bowels, and kidneys as are some of the other remedies named.

While the proper use of these remedies usually brings about the results desired, in others a stage of profuse secretion comes on which in its treatment is identical with that seen in chronic bronchitis, chronic "winter cough," and emphysema, so these diseases will therefore be considered together.

In old persons suffering from dilated bronchial tubes, from emphysema, and from chronic bronchitis there is constantly poured into the air-passages so free a secretion that persistent coughing is necessary to rid the lung of enough of the mucus and liquid to enable the man to breathe. Any excess of this exudation drowns him in his own secretions, and the constant obstruction to the ready flow of air and blood in the lung soon produces dilatation and weakness of the right side of the heart. The same condition in a more acute form sometimes asserts itself in young children and in adults. In children it sometimes comes on so suddenly as to be known as "acute suffocative catarrh," while in older persons it appears with sufficient severity to make the condition of the patient most serious. Of the treatment of the latter state the writer will speak at once.

The objects desired are to rid the lung of the liquid secretions, to prevent the outpouring of more exudations, and to support the patient until the crisis is past. Where the exudations rapidly fill the lung, nothing is better in the strong child or adult than an active emetic, such as apomorphine, hypodermically, in the dose of $\frac{1}{10}$ grain (0.006) to an adult or $\frac{1}{20}$ to a child, which is not to be repeated; if this dose fails to act in ten minutes, ipecac may be used instead in the form of the powder, a small teaspoonful for a man or 5 to 10 grains (0.35–0.65) for a child, or, if the powder be not at hand, a wineglassful (32.0) of the wine or syrup of ipecac to an adult or two teaspoonfuls (8.0) to a child may be given. Digitalis should be administered to support the heart, and strychnine be employed in full dose to stimulate the respiratory centre and excite the nervous system, which is generally depressed by the increasing carbonic acid in the blood. For the same purpose caffeine or strong coffee may be used. Oxygen may be inhaled, and to stop the profuse secretion atropine may be used by the mouth or hypo-they only last a few days or hours, as the mucus is so loose as to be easily coughed up and the lung readily cleared.

The object of the physician is to use remedies which will stimulate the bronchial tubes and increase the volume of liquid poured out. For this purpose the bronchitis tent may of course be employed, but the drugs to be used internally are ammonium, chiefly the chloride, and the pitches and turpentines, such as terebene, pyridine,[1] or even turpentine itself.

In the majority of instances an ammonium mixture will be the best and most serviceable prescription, in one of the following forms:

℞.—Ammonii chloridi	ʒij (8.0).
Ext. glycyrrhiz. fluid.	ʒij (8.0).
Aquæ destillat.	q. s. ad f℥iij (96.0).—M.

S.—Teaspoonful (4.0) every four hours.

Or,

℞.—Ammonii chloridi	ʒij (8.0).
Mist. glycyrrhiz. comp.	f℥iij (96.0).—M.

S.—The same dose.

The disadvantage of the latter prescription is the presence of antimony in the compound liquorice mixture, which is contraindicated if debility exists.

If the cough is troublesome, a little morphine or belladonna may be added, or the following be used, particularly if any signs of cardiac failure appear:

℞.—Ammonii chloridi	ʒj (4.0).
Ammonii carbonatis	ʒj (4.0).
Ammonii bromidi	ʒj (4.0).
Extract. glycyrrhiz. fluid.	ʒiv (16.0).
Aquæ destillat.	f℥vj (192.0).—M.

S.—Dessertspoonful (8.0) every four hours.

In this prescription the first constituent acts particularly on the air-passages, the second stimulates the heart and respiration, and the third allays the cough, while the liquorice covers the salty taste of the ammonium.

℞.—Codein.	gr. ij vel iv (0.–0.2).
Ammon. chlorid.	ʒj (4.0).
Ext. glycyrrhiz. fl.	f℥j (32.0).
Aquæ	q. s. ad f℥ij (64.0).—M.

S.—Teaspoonful (4.0) every two hours in water.

An oro-nasal respirator, with the sponge saturated with equal parts of terebene, iodide of ethyl, and chloroform, may be worn in order to allay cough and loosen the mucus.

If the administration of the chloride of ammonium does not aid in the expulsion and liquefaction of the secretion and rid the lungs rapidly of the mucus, the use of terebene in 5- or 10-minim (0.35–0.65) capsules may be resorted to with great success. If capsules cannot be supplied, terebene may be made into an emulsion with acacia or tragacanth and given in this way. Sometimes terebene will irritate the kidneys and produce a sense of weight across the loins; if this occurs its use should be stopped. In other cases it will disorder the stomach or cause diarrhœa. These effects are not, however, commonly seen. Terpine hydrate in 10-grain (0.65) doses may be used three times a day, or terpinol in the dose of 8 to 10 grains (0.5–0.65) in capsules or pills. Certain of the volatile oils and resins are also of value at this time, notably the oleoresin of cubebs and copaiba, which, however, possess the disadvantage of disordering the stomach. The oil of eucalyptus is also of great value, and may be given in capsule or emulsion in the dose of from 1 to 5 drops (0.05–0.35) every five hours. The oil of sandalwood in the dose of 5 to 10 minims (0.35–0.65) is very valuable, and is not so apt to disorder the stomach, bowels, and kidneys as are some of the other remedies named.

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[1] Pyridine, not pyrodine, is used by placing 1 fluidrachm (4.0) on a hot shovel or saucepan in a small room, the patient breathing the fumes, which are carried to him by the air of the apartment.

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The treatment of the more moderate condition of excessive secretion in the bronchitis of old persons, which is more slow in its progress, but which may end as fatally as similar attacks in the young, is somewhat similar to that just given. Injurious results are often produced by the physician failing to recognize that the secretion is sufficiently liquid, and that ammonium and such expectorants are not only useless, but harmful, because they increase the quantity of these liquids. Under these circumstances a fine spray of a solution of tannic acid of the strength of from 2 to 30 grains (0.1–2.0) to the ounce may be used, or of alum solution from a few grains to saturation. Monsel's solution should be employed in the dose of 10 to 15 drops (0.65–1.0) to the ounce (32.0) of water, or acetate of lead may be used in the strength of from 1 to 15 grains to the ounce (0.05–1.0 : 32.0). Belladonna, which checks secretion, stimulates the respiratory centre, and is for this reason a doubly useful remedy. Strychnine is, however, the best of remedies to help the patient get rid of the sputum. It should be given in the dose of $\frac{1}{20}$ grain (0.006) or more three times a day.

The use of remedies designed to allay the cough in these cases is absolutely unjustifiable, as it results in the retention of the profuse secretion. The question as to whether the cough is excessive or not must depend on the ability of the lung to rid itself of the secretions in its bronchial tubes.

BURNS AND SCALDS.

The treatment of burns and scalds is both internal and external, the first being devoted to the quieting of the nervous system after the injury, the relief of pain, and the treatment of shock, and the second to the care of the injured surfaces. Immediately upon being called to a case of burn it is the duty of the physician to determine how badly shocked the patient is, what the condition of the pulse may be, and whether or not the lungs and air-passages are involved. After these mental notes he should give a hypodermic injection of $\frac{1}{4}$ to $\frac{1}{2}$ grain (0.016–0.03) of morphine and $\frac{1}{60}$ of atropine (0.001), and then roll the entire body in a large quilt to maintain the bodily heat while the sufferer is being transferred to the hospital or the house to which he belongs.

In some cases the shock is so great that the pulse flags at once, the temperature falls, and collapse ensues. Stimulants hypodermically, external heat, and warm drinks of water and whiskey are indicated, followed by $\frac{1}{20}$ grain (0.003) of strychnine and 5 minims (0.3) of tincture of digitalis if the circulation does not respond to the less powerful stimulants. A very useful treatment under these circumstances is to immerse the patient in a bath of warm water, hot enough to maintain the bodily temperature. Often while in this bath the burned cuticle is easily removed with but little pain, and the protection from the air decreases dermal irritation.

If time and circumstances permit, the dressings should be applied before moving the patient, but this is rarely possible. By far the best dressing is lint wrung out of a mixture of picric acid. (See Picric Acid, Part II.) Another useful application is linseed oil and lime-water, equal parts, or, if desired, the oil may be rendered antiseptic by the addition thereto of 1 part of carbolic acid to 20 parts of oil. This mixture is also of service in that it acts as a feeble local anæsthetic. The cloths should be renewed every twelve or twenty-four hours, as may be needed, or they may be substituted by lint wrung out of a saturated watery solution of boric acid. A useful ointment for severe burns is composed of:

℞.—Iodoform.	gr. xv (1.0).
Antipyrin.	gr. lxxv (5.0).
Acid. boric.	gr. lxxv (5.0).
Vaselin.	℥ij (60.0).—M.

If the burn is not very diffuse, a solution of the tincture of cantharides, 1 part to 40, upon a rag, is said to relieve pain and aid in healing, but if the burned surface be extensive this treatment cannot be resorted to, owing to possible irritation of the kidneys, which are already overtaxed by the interference with the functions of the skin. In comparatively small burns a saturated solution of carbonate of sodium (washing soda) often does great good in relieving the pain. This relief may depend on the solvent power of this salt over albuminous deposits, formed by the heat, which irritate the peripheral nerves. Sometimes the addition of antipyrin to this solution is of advantage, and the following may be used for superficial and limited burns:

℞.—Acid. boric.	ʒiij (12.0).
Antipyrin.	ʒiss (6.0).
Aquæ purificat.	f℥viij (250 cc.).—M.

A very important point in the subsequent treatment of burns is the remembrance of the close relationship existing between the internal organs, particularly the duodenum and the kidneys, and the cuticle. When we recollect that we try to influence internal congestions—such as pulmonary congestion—for example—by the application of irritation to the skin of the chest, we see at once that a widespread and severe burn is practically a huge counter-irritant and must reflexly affect the viscera.

Again, the skin, being prevented from exhaling impurities, forces the kidneys to do the work, and if the kidneys fail under the strain death results. Whenever the urine is high-colored and cloudy the citrate of potassium should be freely given, 20 grains (1.3) in water three times a day, combined with 30 drops (2.0) of sweet spirit of nitre, care being taken that the depressant effect of the potassium is counterbalanced by stimulants.

In dressing very severe burns the use of a general anæsthetic such as chloroform is proper, but it must be used with caution.

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CHANCROID.

The chancroid is a contagious, non-specific ulcer, which has no definite period of incubation, is distinctly inflammatory in type, and is usually multiple. It is further distinguished from the primary sore of syphilis by the fact that it is auto-inoculable, is not followed by secondary eruptions, and, if it involves the lymphatics at all, produces a monoganglionic unilateral swelling which frequently attains a considerable size and suppurates.

Chancroid, being a purely local affection, would seem to require nothing beyond local treatment: this is true of the uncomplicated sore, but where phagedena or serpiginous ulceration sets in, the question of constitutional treatment is of paramount importance.

The treatment of uncomplicated chancroid is as simple as it is efficient. One thorough cauterization converts the sore into a healthy ulcer, the cicatrization of which is quickly and surely accomplished.

As the most efficient means of thoroughly destroying the chancroidal ulcerations the actual cautery is chiefly commended. This is, however, objectionable to patients. Sulphuric or nitric acid will be found equally serviceable. The pain of these applications may be greatly lessened by the previous employment of a 20 per cent. solution of cocaine. When the surface involved is large the patient should be etherized. The cardinal point in the cauterization of chancoids is to *reach and destroy all the diseased area.* Each pocket and sinus must be thoroughly acted upon, otherwise it remains as a focus for reinfection. A convenient way of both destroying the chancroid and providing for the after-dressing is offered in the application of Ricord's paste. This is made by adding to finely powdered charcoal enough strong sulphuric acid to form a paste of about the consistency of castor oil. This is then applied to every portion of the ulcer. The acid shortly dries out, leaving a dressing of charcoal, which in a few days drops off, exposing a healthy, nearly healed, granulated surface. Where nitric acid is applied the subsequent dressing consists, preferably, in the application of dusting powders, iodoform being the best.

There has been a tendency of late years to substitute for this treatment one less radical, more acceptable to the patient, and in many cases almost equally satisfactory in results. It is certainly true that many of the chancroids as found in persons of robust health show little tendency to spread beyond comparatively narrow limits, and are amenable to mild treatment. It must be remembered, however, that, as long as the smallest portion of such an ulcer remains unhealed it may at any time take on all the features of a virulent ulceration. Moreover, the patient is constantly exposed to the risks of a chancroidal bubo—a complication so troublesome that the possibility of its development constitutes the strongest argument against palliative treatment.

Where the ulceration is entirely superficial, constituting the erosive form of chancroid, iodoform, dusted over the surface of the carefully cleansed granulations, offers the best form of palliative treatment.

As a cleansing and stimulating wash to precede the application of the iodoform 1 drachm (4.0) of nitric acid to the pint (500 cc.) of water is most satisfactory. The objection to iodoform lies in its disagreeable and penetrating odor. To prevent this, great care should be exercised in applying the powder to see that none is distributed elsewhere than upon the sore. The odor can also be disguised to some extent by thoroughly mixing with the iodoform a small quantity of one of the essential oils, such as oil of peppermint or attar of roses, using not over 5 minims (0.35) to 1 drachm (4.0) of the powder. There is no dusting powder which can entirely take the place of iodoform, yet when the objections to the use of the latter are insuperable aristol or iodol may be substituted, or a mixture of 1 drachm (4.0) of zinc oxide and 3 drachms (12.0) of subnitrate of bismuth, or equal parts of calomel and bismuth. Where the discharge is profuse, powdered tannin may be combined with the dusting powder in the proportion of 1 part to 4.

In the ordinary uncomplicated chancroid these dry dressings are greatly to be preferred to wet applications: when, however, the sore is attacked by a high grade of inflammation and becomes indurated, prolonged immersion of the part involved or of the whole body in hot water may be followed by the application of dressings kept constantly wet with the dilute nitric-acid lotion, as given above, or with weak carbolic solution, 5 grains to the ounce (0.35 : 32.0) of water, or with lead-water and laudanum. Where the chancroid assumes the phagedenic type, extending with great rapidity and causing extensive sloughing and destruction of tissue, free cauterization either with the hot iron or by means of nitric acid should be instituted immediately, every portion of the ulcerating surface being thoroughly destroyed. This should be followed by prolonged hot sitz-baths or general warm baths, the patient remaining in the water for days at a time if necessary, and, if practicable, eating and sleeping with the body still immersed. If this is not possible, baths of from two to four hours' duration should be given two or three times daily. After cauterization, powdered iodoform is the best local application in phagedenic cases. In addition the patient may be given full doses of opium, and should receive a tonic and supporting treatment.

Should the chancroid assume the serpiginous type, slowly extending in spite of treatment, till in the course of months or years large areas are destroyed by the process, the warm bath, continued night and day for weeks at a time, together with thorough cauterization of the entire diseased surface with the hot iron, represents the most satisfactory method of treatment.

The chancroidal bubo is best avoided by prompt and thorough cauterization of the sore: when it occurs, however, it should be first treated by rest, pressure, and counter-irritation, since it may be a simple inflammatory adenitis, and with care may not run on to suppuration. Iodine may be painted *around* the swollen area, the patient should be put to bed, and a compress, together with a spica bandage of the groin, should be applied, or this may be substituted by a hot bag placed upon the inflamed gland. At the first sign of suppuration the bubo should be opened freely, should be washed out with bichloride solution, 1 : 1000, peroxide of hydrogen half strength, or chloride of zinc 40 grains to the ounce (2.65 : 32.0) of water, and should be packed with iodoform gauze. If the bubo takes on phagedenic action, it should be treated precisely as the phagedenic chancroid.

CHOLERA, ASIATIC.

The treatment of this exceedingly dangerous disease is prophylactic, curative, and convalescent.

The first measures consist of strict quarantine, both public and private, the avoidance of all water for culinary purposes which has not been boiled at least an hour and cooled in a place devoid of germs, and the employment of those foods which, while preserving the normal bodily health, in no way predispose to intestinal disturbances, as do some of the fruits, as melons and grapes. If these things are attended to, little remains to be done; but it is worthy of remark that sulphuric acid is a drug which is harmless in itself, yet apparently one which is possessed of distinct prophylactic power in this disease.

Dividing the disease into three stages, we find as the earliest symptom some disturbance of peristaltic movement, with or without pain, or in other instances the patient is attacked with a sudden flux of the intestinal contents. If there is a history of the ingestion of bad or indigestible food, there is no doubt whatever that this foreign material must be gotten rid of by the use of castor oil or sulphate of magnesium, the latter being the best, because it is more rapid and less apt to cause griping. No purgative should be given unless the history of the ingestion of bad food is most direct and clear.

When the attack is sudden in its onset, as is usual, the question arises, Shall we resort to opium by the mouth? The answer, after having carefully considered the statements of a large number of authors, is that we should not use opium by the mouth or hypodermically except in cases where the pain or cramps are so excessive as to absolutely require the drug. In other words, it is to be given for the pain, not for the diarrhœa. Should opium be used, it is infinitely better to employ it by the rectum in the manner to be described later, and if it is necessary to use it by the mouth, only the deodorized opium or the deodorized laudanum should be employed, since these preparations are less apt to cause nausea than their fellows.

Camphor, on the other hand, seems to be universally regarded as a most useful drug, tending at once to stop diarrhœa and relieve the pain and cramps from the beginning to the end of the attack. Whether camphor exercises any germicidal effect on the cholera bacillus we do not know. Certain it is that volatile oils all possess distinct antiseptic powers. Aside from any such influence, camphor is useful as a general systemic stimulant, and has been proved by wide clinical observation to have a very extraordinary power in the control of all forms of serous diarrhœa, particularly true cholera. The spirit of camphor has proved most effective in cholera epidemics. Frequently the use of camphor so controlled the diarrhœa and stimulated the torpid kidneys that anuria was set aside in twenty-four hours. Under these conditions camphor wine has been found to be very useful; it is to be made by adding 75 grains of finely-powdered camphor to a quart bottle of strong red wine, to which is also added gum arabic and alcohol. The camphor is first dissolved in the alcohol, and then thoroughly mixed with the wine. The dose of this mixture is a teaspoonful, in peppermint tea, every hour to a child of six years, for an older child a dessertspoonful, and for an adult a wineglassful. Those who first used this mixture were wiser than they thought, for the recent studies of Pick have shown that both red and white wine are distinctly inhibitory to the growth of the spirillum of cholera, probably because of the tannic or other acid which they contain, as well as the alcohol.

A remedy, the use of which is based on very rational grounds, is salol, and probably the newer drug salophen, which, theoretically, is much better than the former, because it is less poisonous. According to the interesting studies of Löwenthal, salol seems to be peculiarly antagonistic to the bacillus of Koch. This investigator added to a 50-gramme alkaline solution of pancreatic juice 10 grammes of salol, and to this mixture 3 centimetres of a good bouillon culture of the bacillus. Examinations in from forty-eight hours to a week showed this to be absolutely sterile. It was further proved that the salol was inactive until broken up into its component parts—phenol and salicylic acid. Hueppe also asserts that the use of salol prevents the development of anuria.

The use of a remedy originally proposed by Dr. R. G. Curtin has been proved by recent study to be eminently rational. This remedy is sulphuric acid. This drug not only is acid, and so deleterious to the bacillus, but, in addition, is astringent, and is probably eliminated as a sulphate by the lower bowel. As is well known, ordinary cholera morbus yields readily to its influence.

In addition to the treatment already given, which may be used in the second as well as in the first stages, we have measures which must be resorted to for the relief of the dominant symptoms which manifest themselves as the disease progresses.

The symptoms now to be combated are vomiting, excessive purging, cramps in the extremities, and, as the result of these, exhaustion, collapse, and the advent of the algid stage. By far the best results obtained by any one line of therapeutics at this time certainly follows the employment of salol and camphor by the mouth, with enteroclysis and the use of hot baths; or, if these are not possible, hypodermoclysis and the employment of a hot-water bed; or, finally, hot bottles and bricks, for the patient largely dies of cold and of internal congestion of thickened blood, the circulation of which the heart and vasomotor system are unable to control. Atropine and strychnine are very useful, but ether is better than either, given subcutaneously or by the mouth, as a diffusible stimulant.

Very extraordinary results are said by Italian observers to follow the rectal injection of a solution of common salt in the proportion of

1 drachm to the pint (4.0 : 500 cc.) of warm water. In other instances the use of tannic acid in the strength of from 1 to 8 drachms to the pint (4.0–32.0 : 500 cc.) of water has proved very satisfactory. The amount used at each injection should be about 2 quarts (2 litres) and the injection made as gently as possible in order to urge the fluid high into the bowel. The inflow tube should be a soft female catheter, and the overflow tube twice as large as the inflow tube. The tubes are to be inserted side by side after thorough oiling. The injection may be used every two hours and continued till the outflow is clear. This is done to wash out poisonous materials and to supply liquid to the system. A solution much stronger or weaker than that named is dangerous, for similar reasons to those given under the head of Dropsy and Saline Purgatives. (See, also, Enteroclysis, Part III.)

Another useful measure is hypodermoclysis, or the passage of a solution similar to that just named into the subcutaneous tissues of the thigh or belly-wall. (See Hypodermoclysis, Part III.) If done slowly these injections are absorbed readily and supply liquid to the depleted blood-vessels.

(See article on Diarrhœa.)

CHOLERA INFANTUM.

Cholera Infantum is a term often applied to all the forms of active serous diarrhœa afflicting children in the summer months, whether its cause be exposure to high heat, the use of bad food, or both. The treatment by the use of drugs is identical in all forms of serous diarrhœa in children as far as the purging is concerned, but the cause requires great care in its discovery and skill in its removal if that be possible.

In cities, where the heat is often great, the air damp and impure, and the food not always fresh, cholera infantum often appears as a form of thermic fever or heat-exhaustion, or, in other words, as sunstroke. Often in these cases the temperature in the rectum will be found febrile, while that of the axilla is below normal, and, as pyrexia does harm to the internal organs, the internal temperature must be lowered by cool drinks, by administering pieces of ice, and the irrigation of the bowel, which will be described in a moment. The diarrhœa in such cases is dependent upon a relaxation of the blood-vessel walls in the intestine by reason of the influence of the high heat upon the splanchnic nerves, and to irritant matters derived from food and resulting from defective secretion of the digestive juices. If the thermometer placed high up in the rectum shows a subnormal temperature, heat-exhaustion is present, not thermic fever, and the treatment is reversed. Hot drinks are to be used, external heat applied, and friction of the limbs resorted to, or the child may be put in a hot bath at a temperature of 105° F., its temperature being carefully watched lest it rise suddenly to a point above the normal. Avoidance of milk and the use of a few drops of beef-juice for twenty-four hours is the best order as to diet. If vomiting is active and collapse is threatened, a drop or two of good brandy should be used in each teaspoonful of food, and the value of atropine as a vasomotor stimulant is not to be forgotten.

There is another form of cholera infantum which is not due to a high atmospheric temperature alone, but more commonly to the ingestion of irritant foods or foods unsuited to a child, obtained by the patient surreptitiously or through the ignorance of the parents. If there is such a history and the probable cause is discovered by reason of some of the masses of undigested food having been passed, a purgative dose of castor oil (1 to 2 teaspoonfuls [4.0–8.0] to a child of two years), with 20 drops (1.3) of paregoric, should be used to sweep out the offending materials and allay irritation, and be followed at once by the treatment which will be spoken of in a moment. Care, of course, should be taken to maintain the bodily heat, or lower it if it is above the normal, and a watch must be kept upon the pulse and breathing to note any changes requiring stimulants.

There is still another class of cases. The physician will be called to see a child with the same history of having taken indigestible food or of there being curds in the stools. Careful examination will show that there is much bearing down, or in other cases a simple running off of the liquid from the bowel almost without effort. Very soon, indeed, the passages become entirely colorless, except for a speck or two of green, which shows the presence of the peculiar micro-organism which produces this color. The diapers have a peculiar mousy odor, and are characteristic; that is, they seem to be only wet and odoriferous, and contain no solid matter. If closely examined, they will be seen to be soiled by a small amount of a whitish substance, looking like a paste made of water and fine chalk. Such a passage bodes ill for the child unless treatment is instituted. The physician should order, *at once*, $\frac{1}{20}$ grain (0.003) of podophyllin for a child of six months, to be taken in two doses, half an hour apart, in 20 drops of brandy with a little water. Two hours after this the dose should be repeated, and again in two hours more if necessary. By the end of the fourth hour there will be generally seen in the movements of the bowels a trace of color, and this will gradually become more marked if the case is to have a favorable termination.

As soon as the movements have changed from the pasty-white motions named to those having a bilious color, then, and not till then, are astringents to be employed. If they are used before this, the diarrhœa may become less for a few hours, but the child absorbs poisons from its alimentary canal and rapidly goes into collapse.

The rationale of this treatment rests upon the fact that owing to the disease every gland connected with the alimentary canal has become inactive. It is absolutely necessary to bring about glandular activity, and podophyllin, in the experience of the author, is the best remedy for this purpose. During the period that the podophyllin is acting it is well to apply a spice plaster to the belly or to immerse the child for short intervals in a hot bath to preserve its bodily temperature.

In practically every case of cholera infantum it is of the utmost importance to stop milk-feeding absolutely for a few days. Nothing in the way of food may be given except Valentine's or expressed beef-juice, 10 drops (0.65) every two hours with a little cold water until all curds and undigested food are removed.

After these measures have been resorted to, and the chief object—namely, a colored stool, not green—obtained, if the diarrhœa continues it must be stopped gradually. The medicinal treatment should consist in the use of a mixture such as the following for a child of a year or eighteen months:

℞.—Acid. sulph. aromat.	gtt. xxx (2.0).
Tr. opii camphorat.	f℥iij (12.0).
Elixir. curaçoæ	f℥ij (8.0).
Aquæ cinnamomi	q. s. ad f℥iij (96.0).—M.

S.—Teaspoonful (4.0) in a little water every two hours.

Or,

℞.—Acid. sulph. aromat.	gtt. xxx (2.0).
Ol. caryophylli	♏viij (0.5).
Tr. opii camphorat.	f℥j (4.0).
Spirit. chloroformi	gtt. xlviij (3.0).
Syr. zingiberis	q. s. ad f℥iij (96.0).—M.

S.—Teaspoonful (4.0) every two hours.

If preferred, the tincture of kino or compound tincture of catechu may be substituted for the oil of cloves or the spirit of chloroform, or, again, the fluid extract of hæmatoxylon may be taken in the place of either of these.

Where the vomiting is very severe and incessant, the purging profuse, but free from undigested curds, a rectal injection of starch-water, 2 ounces (64.0), containing 10 drops (0.65) of laudanum, is to be employed, and at the same time $\frac{1}{6}$ of a grain (0.01) of gray powder (hydrargyrum cum creta) given every hour if the podophyllin is not well retained. The gray powder may in turn be substituted by $\frac{1}{12}$ of a grain (0.005) doses of calomel. Very minute doses of arsenic given by means of the following solution are often of service in checking the vomiting and purging, and should be resorted to if necessary:

℞.—Liq. potassii arsenitis	gtt. j vel ij (0.1).
Aquæ cinnamomi	f℥j (32.0).—M.

S.—Teaspoonful (4.0) every fifteen minutes until four teaspoonfuls (16.0) are taken.

In some cases the remedies named above only stop the diarrhœa for the time being, and it returns as soon as they are withdrawn. In such a case the following is of value to restore the lost tone of the parts involved:

℞.—Resinæ podophylli	gr. ½ (0.03).
Liq. potass. arsenit.	gtt. iij vel vj (0.18).
Liquor calcis	f℥iij (96.0).—M.

S.—Teaspoonful (4.0) every five hours. Shake well before using.

Or a powder may be used:

℞.—Resinæ podophylli	gr. ¼ (0.016).
Pulv. ipecac.	gr. j (0.06).
Sacchar. lact.	gr. xx (1.3).—M.

Ft. in chart. No. x.
S.—One powder every five hours.

A very important, never-to be-forgotten measure in cholera infantum is the use of counter-irritation over the belly by means of a mustard plaster (1 part mustard flour to 4 of wheat flour) or by a spice plaster. The plaster should be renewed as often as it cools, and kept on continuously if the skin will stand it.

A remedial measure carried out with great success in cities in the treatment of cholera infantum is the use of irrigation of the bowels, or rather washing out of the colon. This is accomplished by the use of the solution named in the articles on Cholera and Enteroclysis. The inflow tube should be of soft rubber, like a female catheter. The outflow tube should be larger, in order to carry off flakes of food or mucus. They may be inserted side by side after being oiled. The pressure used should be by a fountain-syringe raised not more than three feet above the buttocks, and the outflow should be clear and unobstructed. The irrigation may be resorted to every hour or two and continued until clear fluid flows away. The solution should, of course, not to be too cold or too hot—say 100° F. (See article on Diarrhœa.)

CHOLERA MORBUS.

This acute, painful, rapidly-exhausting disease arises from exposure to cold, the ingestion of poisonous or irritating foods, exposure to excessive heat, and a number of similar causes.

In reality, it may be regarded in one instance as a gastro-enteritis, and in another as an acute serous diarrhœa associated with much pain of a griping, rending character. Nothing compares to counter-irritation for the purpose of affording relief. A large mustard or capsicum draft should be placed over the abdomen and allowed to remain as long as it can be borne. If the patient knows that he has taken irritant foods, castor oil with 15 to 20 drops (1.0–1.3) of laudanum added to it, to prevent griping, should be employed to sweep out the offending masses before any other remedies are used, and be followed by an antidiarrhœa mixture, such as here follows:

℞.—Acid. sulph. aromat. . . . . fʒij vel fʒiv (8.0–16.0).
Extract. hæmatoxylon fluid. . . . ʒij (8.0).
Spt. chloroformi . . . . f℥ss (16.0).
Syr. zingiberis . . . . . . q. s. ad f℥iij (96.0).—**M.**
S.—Teaspoonful (4.0) every two hours.

If the pain is very severe, the patient should be given morphine (gr. $\frac{1}{4}$) and atropine (gr. $\frac{1}{150}$) hypodermically. (See article on Diarrhœa and Cholera Asiatica.)

CHLOROSIS.

(See ANÆMIA.)

CHOREA.

St. Vitus's Dance is a nervous affection, generally occurring in children, yielding to treatment quite readily in some cases, and in others remaining persistently severe, and even becoming worse, under the physician's care.

The disease is always to be treated by the removal of all sources of reflex irritation, such as worms, a long prepuce if it is irritated by retained urine or smegma, or other trouble of this character, and in the avoidance of punishment or severe rebuke on the part of the attendants. This advice is given not because chorea is produced by such irritating conditions, but because they tend to impair the nervous tone of the patient. Except in that form of the disease closely associated with or dependent upon rheumatism, the profession universally employ arsenic in one of its forms as a specific remedy. Generally Fowler's solution is used, and, unless the parents are intelligent enough to drop medicine carefully from a bottle or dropper, the physician should order a 3-ounce mixture (96.0) with 48 drops (3.1) of Fowler's solution, so that each teaspoonful will contain 2 drops of the drug. Very frequently, to be effective, arsenic must be used in ascending doses, increased 1 drop (0.05) a day, and in consequence the dilution just spoken of has to be avoided and the importance of care in measurement urged upon the patient's relatives.

Whenever arsenic is used the physician should instruct the attendants to stop administering the drug if any puffiness under the eyes is seen in the morning on arising from bed, or if any pain in the bowels ensues, as these symptoms show that the full medicinal action of the drug is being felt.

When arsenic fails, cimicifuga in the dose of 20 to 30 drops (1.3–2.0) of a fresh fluid extract to a child of ten years may be used as the next best remedy.

Where the disease is associated with rheumatism, near or remote, the salicylates or iodides may be of value, and should be thoroughly tried.

In some cases of chorea the muscular jerkings are so severe that sleep is impossible, and the patient has to be held in bed and the bed-covers tied down. These cases will often obtain a quiet night by the use of the hot pack at bed-time. (See Heat.) The child should be placed in a blanket previously dipped in water as hot as can be borne by the patient and thoroughly wrapped up in another (dry) blanket to retain the heat, and then be allowed to sweat. Care must be taken that a heat-stroke does not result, and, if sweating does not come on and oppression ensues, the blanket must be removed. The sheets should be ironed to have them warmed for the patient when he is returned to bed, and it is often better to let him sleep between dry blankets. The efficacy of this treatment is increased by the use of a dose of bromide of sodium or potassium and a little chloral, as follows:

℞.—Chloralis . . . . ʒij (8.0).
Sodii bromid. . . . . ℥ss (16.0).
Aquæ dest. . . . . q. s. ad f℥iij (96.0).—M.
S.—A teaspoonful (4.0) in water every five hours for three doses.

COLIC (HEPATIC).

This exceedingly painful condition, due to the passage of a gall-stone through the bile-duct, is always associated with faintness and nausea.

The object of the physician must be to relieve this pain, not only by the use of anodynes, but also by aiding in the escape of the stone into the bowel. To relieve the pain a hypodermic injection of morphine ¼ to ½ grain (0.015–0.03), accompanied by $\frac{1}{100}$ grain (0.0006) of atropine, is indicated. The morphine not only decreases the pain, but allays spasm, and the atropine relaxes the spasm of the muscular coats of the ducts and allows the stone to pass through the relaxed passage-way. Hot applications, such as turpentine stupes, may be used over the liver, but relaxation is *not* to be obtained by the use of nauseating emetics, as the retching or vomiting may rupture the distended gall-bladder. Severe rubbing should not be used for the same reason.

Very recently the use of olive or cotton-seed oil has been largely resorted to in this affection, and, while we are not sure of the means by which it acts, the studies of Rosenberg and others point to the changing of the oil into glycerin and fatty acids, the first of which liquefies and increases the flow of bile. Often the large dose of oil causes nausea, and this by producing general relaxation may aid in the escape of the stone. The oil is used during the attack of pain, and must be swallowed in the dose of half a pint at least; smaller quantities do not suffice. Its action may be aided and its retention in the stomach promoted by the addition of a drachm of ether to each dose.

Shortly after the oil is swallowed sudden relief often occurs, due to the escape of the stone into the bowel. The stools should then be carefully watched for gall-stones, but care should be taken that the lumps of soap which are passed, made from the oil by the alkaline juices in the intestines, are not mistaken for true biliary calculi. If the pain does not yield to morphine, chloroform or ether may be inhaled for the relaxation of the spasm and the relief of pain.

In the endeavor to render our treatment of a patient with gall-stones rational, we naturally study the causes which induce their formation and the manner in which we can expel those stones which have formed before the case has come under proper care or in spite of any preventive measures which we may have attempted. Unfortunately, we are met at the very beginning of our study by the fact that the physiologist and pathologist have not as yet discovered the exact characteristics of the general systemic conditions which underlie their formation; but, on the other hand, experimental and clinical studies have developed a number of facts which are of great value to us. Thus, we now know that there are a number of local causes which distinctly predispose to the formation of gall-stone, and that these causes are very commonly found in that very class in which the systemic tendency to stone-formation is most marked. In the first place, a catarrhal state of the biliary passages favors the formation of gall-stone by providing an excess of mucin, with the aid of which the stone may be built; secondly, this catarrhal state is commonly associated with, or produces of itself, a diminished alkalinity of the bile, whereby the cholesterin becomes more readily precipitated, and at the same time, it would appear, causes the deposition of an abnormal amount of lime salts, brought from elsewhere in the body and passed out through the mucous membrane.

This latter fact seems proved by the circumstance that bile itself contains very little lime, and that more lime is found in stones lying against markedly catarrhal mucous membranes than in stones not so situated. So far, then, we have a simple pathological process providing no less than three ingredients of stone-formation—namely, mucin, cholesterin, and stearate, or some other salt of lime. There are still two other important factors at work—namely, the systemic state, gouty or otherwise, which tends to stone-formation, and the stasis of the bile in its ducts, because the catarrhal process in the mucous membrane blocks its passage toward the bowel.

Recognizing these etiological factors, it now becomes our duty to oppose them, and we have the following indications to fulfil: 1. By causing a free secretion of bile to produce a rapid flow of fluid which shall be normally liquid and probably normal in its constituents. 2. By the use of alkalies to antagonize the development of acid tendencies and to aid in the solution of mucus. 3. By regulating the diet prevent those hepatic and systemic disorders which tend to the formation of stone. 4. As catarrhal states are often due to or aided by bacterial infection, to produce intestinal asepsis as far as possible.

The normal secretion and flow of bile is best brought about by exercise of a gentle and wisely-directed nature, taken continually and evenly, and particularly those forms of exercise which call into play the abdominal muscles and diaphragm or cause hepatic movements. The chief and best of these is horseback riding, or, if the patient is too feeble for this, massage should be resorted to, the hypochondrium being well but gently kneaded and rubbed daily for a considerable period of time. If the liver seems very torpid, calomel in small divided doses of a fraction of a grain may be given several times a week, or nitro-muriatic acid may be more rarely used. In other instances, where there is reason to believe that the flow is sluggish and the bile not sufficiently alkaline, that catarrh and putrefactive tendencies are present, the administration of benzoate of sodium, or salicylate of sodium, in 10- or 20-grain doses, will result in increasing the flow, increasing the alkalinity, overcoming the catarrh, and then to arrest intestinal putrefaction. If the catarrhal process is very marked, chloride of ammonium will act even more satisfactorily. This treatment seems especially valuable when the stones that are passed are very dark in color, indicating that much pigment and little cholesterin is present. In respect to the use of alkalies, the patient should drink freely of those mineral waters which will provide alkaline substances, such as Contrexeville, Vichy, and Kronenquelle, and it is useful in many such cases to relieve any tendency to constipation or duodenal catarrh by the administration of hot Carlsbad water before breakfast daily. In the matter of regulating the diet, all rich or fatty foods are to be prohibited. Meat should be used in moderation, preferably white meats, and green vegetables largely eaten.

The catarrhal condition, associated with marked bacterial infection, as may be evidenced by some febrile movement, is best controlled by the use of turpentine, chloroform, and ether, given internally, and accompanied by the application externally of hot poultices to the hepatic area. These poultices may or may not be fortified by mustard, and when removed should be replaced by a warm pad to prevent any chilling of the surface of the body.

Of the internal remedies just named, turpentine is the most useful, since it liquefies mucus, aids the flow of bile, and is thought by some physicians to cause the expulsion of the stone by stimulating the walls of the ducts, and that it dissolves the stone. Further than this, its continual use seems to prevent the formation of stone. Ralfe states that it is best given as follows:

℞.—Ol. terebinthinæ	♏v (0.35).
Syrup. acaciæ	f℥ss (15.0)
Sodii sulph. carbolat.	gr. xx (1.35).
Spt. ætheris composit.	♏xv (1.0).
Aquæ menthæ piperitæ	q. s. f℥j (32.0).—M.

S.—To be taken twice or thrice a day.

We would prefer adding compound spirit of lavender instead of peppermint-water. If this mixture cannot be retained by the stomach, the turpentine may be given in capsule, and followed by a draught of milk.

Finally, a most important factor in the prevention of gall-stone formation in susceptible persons is the avoidance of exposure and wet, and, if possible, a residence in a sunny climate during winter months.

CONJUNCTIVITIS.

Simple Conjunctivitis, sometimes called catarrhal, acute, or muco-purulent ophthalmia, is characterized by congestion of the conjunctiva, loss of transparency of the palpebral portion, and some dread of light, with a discharge sufficient only to glue the lids in the morning or free and muco-purulent. In the milder stages the use of a boric-acid lotion (10 grains to the ounce [0.65 : 32.0]) is suitable, and the lids should be frequently washed with neutral soap and water; if there be much muco-purulent discharge, the lid should be everted and an application made of a solution of nitrate of silver (from 2 to 5 grains to the ounce [0.1–0.35 : 32.0]). If the discharge becomes great, bichloride of mercury, 1 : 10,000, may be employed with advantage, and the nitrate-of-silver solution increased to 10 grains to the ounce (0.65 : 32.0), the excess being neutralized with a solution of salt or washed away with tepid water. Much inflammatory reaction in this disease may be alleviated by cold compresses. These are rendered more efficacious if dipped in equal parts of water and the extract of hamamelis. Patients suffering from catarrhal conjunctivitis should be protected from tobacco-smoke, bright light, dust, or any mechanical irritant. Atropine usually is unnecessary unless a corneal ulcer complicates the affection. The patient may wear smoked glasses, but *under no circumstances must the eyes be bandaged or have poultices applied to them.* Domestic medication of this sort may change a simple ophthalmia into a serious and purulent inflammation. Topical medications other than those mentioned are biborate of sodium (gr. iv–viij to the ounce), alum (4 to 8 grains to the ounce [0.3–0.5 : 32.0]), sulphate of zinc (1 to 2 grains to the ounce [0.05–0.1 : 32.0]), which may be suitably combined with boric acid, creolin, 1 per cent.

solution, peroxide of hydrogen, and pyoktanin, 1 : 1000; the latter remedy, however, has not justified the claims which have been made for it. During the subsidence of the inflammation, and if it shows any tendency to become chronic, the application of an alum crystal or a solution of tannin and glycerin (10 grains to the ounce [0.65 : 32.0]) is suitable. It should be remembered that muco-purulent ophthalmia may become epidemic in crowded institutions, and great care should be taken to isolate cases. One soiled towel may be the source of infection to a great number of children. Constitutional treatment ordinarily is not required, but proper hygiene, fresh air, good food, the intelligent use of laxatives, tonic doses of quinine, and whatever treatment is indicated by any associated condition, are useful. The associated conditions most commonly are nasal catarrh, bronchitis, a general cold, eczema of the face, and the exanthemata.

Burns of the Conjunctiva.—Immediately after the accident all foreign particles should be removed or neutralized with a weak acid or alkaline solution if a liquid caustic or acid solution has entered the eye; then a few drops of cod-liver oil may be instilled and atropine employed (suitably incorporated with liquid vaseline) to prevent iritis. The chief danger lies in the formation of severe corneal inflammation and symblepharon; the latter may sometimes be prevented by daily breaking up the granulation-tissue or by the insertion of a piece of gold-beater's skin between the inner surface of the lids and the eyeball. The associated conjunctivitis and keratitis require treatment differing in no way from that described in the idiopathic forms of these affections.

Purulent Conjunctivitis, which is commonly seen in the adult in the form of gonorrhœal ophthalmia and in the infant as ophthalmia neonatorum, is produced in both varieties by the introduction into the eye of a specific virus from either the urethra or the vagina. The chief danger of the disorder is destruction of the vitality of the cornea and loss of sight. The most important indication is to prevent this danger by reducing the amount of swelling of the lids and conjunctiva and the profuse discharge, which are the characteristics of the disease. These indications are met best in the following manner: Hourly cleansing of the eyes with an antiseptic solution, preferably bichloride of mercury (1 : 8000) or a saturated solution of boric acid. During the acute inflammatory stage, and before the discharge is profuse, astringents and cauterants must not be applied. When this stage has arrived and the conjunctiva is profusely covered with discharge, the lids should be carefully everted once a day, wiped clean of every particle of pus, and carefully touched with a solution of nitrate of silver (10 to 20 grains to the ounce [0.65 : 32.0]), and the excess neutralized with a few drops of a solution of common table salt. In the early stages iced compresses wrung out of carbolized water and frequently changed will help to reduce the reaction, or these compresses may be made by placing squares of lint upon a block of ice and thus securing intense cold. If the vitality of the cornea is threatened, it is advisable, in many instances, to substitute for the cold applications hot compresses of a temperature of 110° F.

These may be applied for from ten to twenty minutes every two or four hours, according to the exigencies of the case. The appearance of ulceration in the cornea calls for the use of atropine or eserine. Atropine was formerly employed almost exclusively; in recent times great success has followed the adoption of eserine. This is especially applicable if the ulceration should form in the periphery of the cornea. In adults high reaction and violent inflammation may be alleviated by the use of leeches to the temple. Bleeding of any sort is not applicable to newborn infants. Other applications which have met with favor at the hands of various surgeons are solutions of sulphocarbolic acid, sulphate of alum, sulphate of zinc, nitrate of silver, creolin (1 per cent.), and iodoform ointment. Both blue and yellow pyoktanin have been recommended, but do not yield satisfactory results. Peroxide of hydrogen is a good cleansing agent, but healing does not progress as favorably under its influence as with bichloride of mercury and nitrate of silver. Solutions of permanganate of potassium and aqua chlorini have many advocates. Mules has recommended a treatment with alcohol and corrosive sublimate. The preventive method of treating ophthalmia neonatorum that has obtained the happiest results is that instituted by Credé—namely, the dropping of a 2 per cent. solution of nitrate of silver into the eyes of the newborn infant. If one eye alone is attacked in gonorrhœal ophthalmia, the other should be protected by covering it with Buller's shield, which consists of a watch-glass fixed in a square of plaster, which is carefully applied so that the crystal comes directly in front of the eye, and the plaster covers the surrounding area.

Chronic Conjunctivitis may result from an antecedent acute inflammation of the conjunctiva or exist as an idiopathic affection, especially in elderly people, in whom it sometimes becomes a troublesome symptom, especially if complicating cataract. The characteristic lesions are roughness of the papillæ of the conjunctiva, swelling of the caruncle, and soreness of the angles of the eyelids. There are no granulations, although the disease is sometimes inaccurately spoken of as granular lids. A soothing wash is indicated (10 grains of boric acid to the ounce [0.65 : 32.0] of water), to which may be added 2 grains (0.1) of cocaine, provided the cornea is not ulcerated, and for which a similar boric-acid lotion with 4 grains (0.3) of salt to the ounce (32.0) may be substituted. A very suitable local application is *lapis divinus* (sulphate of copper 1 part, alum 1 part, nitrate of potassium 1 part, fused together, and camphor equal to one-fiftieth of the whole added. The mass is run into sticks. and the application made to the everted lips, or 1 grain (0.05) of the same preparation to the ounce (32.0) of water may be dropped into the eye). Other useful applications are tannin and glycerin (10 grains to the ounce [0.65 : 32.0]), yellow-oxide of mercury salve, and alum crystal. If refractive error exist, this should be corrected. It is to be remembered that chronic conjunctivitis distinctly contraindicates any operative interference in the eye, as, for instance, cataract extraction.

Lachrymal Conjunctivitis is a name given to a chronic form of inflammation of the conjunctiva, associated with obstruction in the lachrymal duct, and characterized by a tear-soaked appearance of the eye, small pustules at the roots of the lashes, and a gummy discharge along the palpebral margin. This can be cured only by relief of the stricture of the nasal duct which causes it, but may be alleviated with the same remedies recommended in the treatment of chronic conjunctivitis. Good results are reported from the use of pyoktanin.

Follicular Conjunctivitis—a disease sometimes mistaken for granular lids, but having a distinct clinical difference, inasmuch as the swollen follicles are absorbed without the production of cicatricial changes in the conjunctiva—requires for its local treatment weak astringents and antiseptic lotions, and the application to the swollen follicles of an ointment of sulphate of copper (gr. ½ to the drachm [0.025 : 4.0]), dusting in calomel either alone or with equal parts of subnitrate of bismuth, or iodoform or aristol used in the same way. If the disease is stubborn, the swollen follicles should be crushed with forceps.

This disease, or one analogous to it, is sometimes produced by the prolonged instillation of atropine, and less frequently by eserine and cocaine. If this is its cause, the drug must be suspended and the surface painted with an alum crystal.

Granular Conjunctivitis.—This disease may be divided into acute and chronic granulations. In the former astringents and caustics are inadvisable, the eyes requiring weak antiseptic solutions like boric acid or salicylic acid and the instillation of atropine. Leeches to the temple will aid in reducing the inflammatory reaction. In the chronic disease the object of treatment is to bring about absorption of the granulations which are its characteristic lesion, not by an application so caustic as to destroy the mucous membrane around them, but of sufficient vigor to produce healthy reaction. The following applications comprise those which have been employed with the greatest success: 10-grain (0.65) solution of nitrate of silver if there is discharge, applied once a day with neutralization of the excess; sulphate of copper in the form of a crystal, carefully applied to the everted lids and the retrotarsal folds; pure carbolic acid, applied with a camel's-hair pencil and the excess washed away with water; glycerole of tannin (tannic acid grs. 30 [2.0], glycerin 1 oz. [32.0]), best applied with a cotton applicator; boroglyceride from 20 to 50 per cent., according to the vigor of the granulations. Strong solutions of corrosive sublimate are employed in the following manner: Solutions of the strength of 1 : 300 or 1 : 500 are painted on the everted lids every second day, the pain of the application being alleviated by the previous instillation of cocaine, while three times daily the eyes are irrigated thoroughly with a solution of the mercury salt, 1 : 7000. Among the many other applications which may be used in this disease the following may be mentioned: liquor potassa, beta-naphthol, iodoform or aristol in powder or salve, an ointment of the yellow oxide of mercury, calomel, and hydrastin. The surgical means which are employed to destroy the granulations are scarification of the conjunctiva, an inadvisable method; excision of the granulations, useful if these exist in isolated groups; crushing the granulations with specially devised forceps, a method often followed by satisfactory results; scarification, followed by a vigorous brushing of the affected tissue with a brush containing short bristles, previously dipped in a strong (1 : 500) solution of corrosive sublimate (Grattage); and excision of the fornix conjunctiva. In long-standing cases associated with inveterate pannus De Wecker has proposed the use of an infusion of jequirity (3 per cent.). This produces an intense membranous conjunctivitis, which must be treated by iced compresses or similar measures to reduce its reaction, but when it has subsided the pannus is often relieved. This method has not been employed in recent times to the extent that it was practised when first introduced.

Diphtheritic Conjunctivitis is rare in this country, but on the continent of Europe occasionally occurs as an epidemic. It may appear alone or in association with diphtheria of the throat and nose. The initial subjective symptoms are those of purulent ophthalmia; the characteristic objective symptoms, a board-like infiltration of the lids with a deposit of gray membrane upon the palpebral conjunctiva. More than in any other eye disease destructive inflammation of the cornea is threatened. In the early stages the eye should be frequently cleansed with boric-acid or bichloride-of-mercury solutions, and atropine instilled, while hot compresses help to maintain the nutrition of the cornea more perfectly than the cold compresses which were formerly recommended for antiphlogistic purposes. Tweedie has highly recommended a solution of quinine (3 grains to the ounce [0.25 : 32.0]); Burgomaster, insufflation of flowers of sulphur; while in France the local application of lemon-juice or citric-acid ointment has been endorsed; Galezowski uses oil of cade (1 : 10). In the early stages all caustics are contraindicated; after absorption of the membrane and re-establishment of the discharge the cautious use of nitrate of silver in the manner described under Purulent Ophthalmia may be employed. The constitutional measures for diphtheria are necessary.

Chemosis of the Conjunctiva, in which this membrane is infiltrated with serum, is usually a symptom of other ocular disorders, and subsides with the general treatment directed to their relief. Good results may follow nicking the swollen tissue with a pair of scissors, the application of a warm, moist compress, and the use of astringents, especially alum.

Hemorrhage beneath the Conjunctiva (subconjunctival ecchymosis) may follow an injury, occur during a paroxysm of whooping cough, and occasionally, in elderly people, may appear spontaneously. No treatment materially hastens the absorption of the blood, unless it be massage of the globe through the closed lid; any associated conjunctival irritation may call for a boric-acid and cocaine wash.

Xerosis of the Conjunctiva, depending upon a cicatricial metamorphosis and the absence of normal moisture, is seen after long-standing inflammations (granular lids, diphtheria, pemphigus), and is incurable. The affection may be relieved by the local use of glycerin, almond oil, emulsion of cod-liver oil, or the use of weak alkaline solutions. Transplantation of the rabbit's conjunctiva has been tried without success.

CONSTIPATION.

This troublesome state depends on a number of causes, the most common of which is the following of a sedentary life totally devoid of the exercise intended to keep the intestinal and hepatic secretions in an active state. Another frequent cause is simple laziness, which causes the patient to resist the call of the bowel for evacuation until this part of the body becomes indolent and atonic, while modesty often causes constipation in females, because a woman prefers to suffer rather than go to a closet which may be somewhat publicly situated. In other instances constipation seems to be hereditary, and to depend upon deficient nerve-supply or muscular weakness and lack of secretion in the lower bowel, or upon hepatic torpor.

Whatever the causes are, they should be sought for, and, if possible, removed, the physician not being content to order purgatives, which, while they may give temporary relief, soon lose their power.

Further than this, it must be remembered that hygienic measures always take first place in the method of treatment, and, if possible, drugs should occupy a very secondary *rôle*. Particular attention should be paid to diet, and the physiology of peristalsis must be well borne in mind.

It has been proved by a large number of studies, both in the normal intestine and by the use of purgatives, that peristalsis is almost entirely a reflex action depending for its existence upon the integrity of the nervous plexuses in the intestinal walls—namely, those of Auerbach and Meissner—the first of which are situated between the longitudinal and circular muscular fibres which they supply, the latter existing in the submucosa and supplying the walls of the villi, the glands of Lieberkühn, and the small arteries and venules.

It has also been found that the vagus nerve, when stimulated reflexly or directly, increases peristalsis, and that moderate stimulation of the splanchnic nerves decreases it.[1] It at once becomes evident that any decrease in the normal activity of these nerves and nerve-centres must speedily result in constipation, and the costive condition consequent upon hepatic torpor is due to the fact that the intestinal walls do not receive the proper stimulation from the bile to set in motion a reflex peristaltic wave the result of which will be evacuation. This fact rests upon the results of direct experiments, which prove the bile to be primarily an intestinal stimulant, antiseptic, and promoter of secretion.

Other series of experiments have shown that the circulation of the blood through the intestines greatly influences peristalsis, and disorders in the blood-supply readily bring on intestinal disorder.

The deductions to be drawn from these facts are many. In the first place, it is evident that the maintenance of an active, normal circulation of blood in the abdomen and a free pouring out of bile from the liver and gall-bladder are necessary to a healthy peristalsis;

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[1] Some persons believe that Meissner's plexus receives impulses from the walls of the intestine and transmits them to the motor plexus of Auerbach, which then sets in motion peristalsis.

and we find that, aside from drugs, we have a number of remedial measures which are to be resorted to according to the means of the patient. By far the best of these is horseback exercise for at least an hour a day or every other day, which by the motion actively stirs up and excites the abdominal viscera as no other measure can do. If for any reason horseback exercise is impossible, then abdominal massage, carried out by a capable "rubber," is to be tried, the hands following more particularly the course of the ascending, transverse, and descending colon, the kneading movements being also applied to the hypochondriac regions. If neither of these measures can be used, then the patient must resort to those gymnastic movements which involve the abdominal muscles, either by the use of dumb-bells or pulleys, such as are sold under the name of "home gymnasiums," or by bending the body forward, backward, and laterally, with the fists pressed into the hypogastrium.

At the same time that these measures are directed the diet of the patient must be so regulated that the food shall contain a large amount of residue—that is, after digestion enough of the husk of the grain or enough vegetable fibre must be left free in the intestines to form a stimulus to the intestinal wall as it slips over the mucous membrane. If a meat diet is largely used, so little residue is left after digestion that constipation ensues, but if vegetables are largely eaten the reverse is the case. No better evidence of this can be adduced than the hard, clay-like passages of the dog and the soft passages of the cow. Very often a plateful of cracked wheat (wheaten grits) eaten at breakfast each morning, or the use of bran bread, will relieve a chronic tendency to constipation. In these cases milk as a prominent article of diet is to be avoided above all things, since it is almost entirely assimilated and leaves no residue, though it supplants other foods. Green or canned corn is of great service. Fruits do good in constipation in one of two ways—they either contain residual materials or sufficient vegetable acid salts to be laxative. Figs, by reason of their many small seeds, which scrape the mucous membrane during peristalsis, are particularly valuable, and apples, prunes, dates, and tamarinds are all useful. It must be remembered that strawberries, raspberries, and blackberries are generally constipating rather than purgative. In regard to drink, nothing is so good as a glass of cold water taken on arising in the morning or just before breakfast, or, if the cold cannot be borne, then a glass of as hot water as can be swallowed with comfort may be substituted. Coffee is constipating to most persons, largely because of its empyreumatic oil, and tea has the same tendency because of its tannic acid. Brandy, as every one knows, is distinctly constipating, and whiskey possesses so little power to the contrary as to be devoid of influence in either direction. Beers differ in their properties, some of them increasing and some of them decreasing intestinal activity.

The patient suffering from constipation should go to stool regularly after breakfast every day even if the attempt is abortive, and so train the bowel to having a movement at this time.

The use of drugs for the relief of constipation is capable of division into two parts: first, the employment of remedies to unload the bowel which has become filled; second, the use of drugs which will so influence the intestines as to cause evacuation and produce normal activity, or, in other words, drugs which will cure the tendency instead of giving temporary relief. Of the first class we find the various purgative salts, jalap, colocynth, senna, mercury, castor oil, and rhubarb; of the second class, aloes, cascara sagrada, manna, tamarinds, rhamnus frangula (buckthorn), phosphate of sodium, and small doses of podophyllin. The physician should bear in mind that defecation is a normal physiological act which must be continued all through life, and it is almost as foolish to stimulate the bowel continuously to peristalsis as to perpetually employ heart stimulants or respiratory excitants.

Although they are habitually employed by many persons in daily doses, the purgative salts are exceedingly harmful in such instances, rapidly losing their power and decreasing the patient's strength by the abstraction of liquids and salts from the blood. They often produce anæmia when constantly used. These salines are to be employed simply to unload the bowel when an excess of fæcal matter has accumulated or when irritant materials are to be swept out of the alimentary canal. In some cases of pelvic congestion associated with constipation magnesium sulphate may be given by enema in the proportion of 2 ounces (64.0) of the salt, 1 ounce (32.0) of glycerin, and 4 ounces (128.0) of water. In some rare instances, where great plethora exists, a course of Hunyadi water, Friedrichshall or Carlsbad waters is of service, but these instances are rare indeed in America. Jalap, colocynth, and senna are not to be used constantly, as they are too active and the reaction from their effects causes constipation. Rhubarb is commonly used, but is of its class peculiarly unfitted to its task. Although it purges, it is distinctly astringent, and is therefore more constipating in the end than if no drug had been used.

Mercury is exceedingly harmful if used continuously as a purge, and is the cause of much ill-health, of bad teeth, and of digestive troubles. Castor oil is notorious for its tendency to cause ultimate constipation.

Of the curative class of laxatives none compare to cascara sagrada, particularly in the form of the aromatic fluid extract or cascara cordial. Originally, this drug as prepared was very bitter, but it is now made almost tasteless by certain manufacturers. This is the only drug which alone moves the bowels and at the same time tends to make future passages more easy and regular; the dose is 10 to 40 drops (0.65–2.65) of the fluid extract or 1 to 6 drachms (4.0–24.0) of the cordial. There is almost no griping produced by it. For the regulation of the bowels of young children, particularly if the case have a tendency to rickets, phosphate of sodium in the dose of 5 to 10 grains (0.35–0.65) in milk is the best laxative, and the same salt may be used in 30- to 60-grain (2.0–4.0) doses in adults. Manna is to be classed as a laxative, but even it sometimes makes the intestinal torpidity ultimately much worse. The two remaining drugs of this class, aloes and podophyllin, should always be used in combination with other non-purgative drugs, as is seen in the following formula:

℞.—Aloes socotrinæ . . . . gr. xx vel xl (1.3–2.65).
Extract. nucis vomicæ . . . . . gr. iv (0.3).
Extract. physostig. . . . . . . gr. iij (0.25).
Extract. belladonnæ . . gr. iv (0.3).—M.
Ft. in pil. No. xx.
S.—One pill at night or night and morning.

Or,

℞.—Resinæ podophylli . . . . . . gr. ij vel iv (0.1–0.3).
Extract. nucis vomicæ . . . . . gr. iv (0.3).
Extract. physostig. . . . . . . gr. iij (0.25).
Extract. belladonnæ . . . . . . gr. iv. (0.3).—M.
Ft. in pil. No. xx.
S.—One night and morning.

The object of using several of these drugs is seen at a glance. We have already learned that nearly all purgatives tend to produce griping. The nux vomica acts as a bitter tonic and stimulant, and prevents subsequent atony of the mucous membrane, as well as increases reflex action, and consequently improves peristalsis; the physostigma is a tonic to the unstriped muscular fibre and gives it strength; the belladonna aids peristalsis by depressing the inhibitory fibres of the splanchnic nerves, by allaying spasm, and by decreasing griping. In using these drugs, aloes and podophyllin, we should remember that aloes is slow and acts particularly on the lower bowel, and that podophyllin acts chiefly on the upper bowel and is the slowest purge in the list of purges.

In obstinate constipation we are sometimes forced to resort to the compound cathartic pill of the *U. S. P.*, or its modified form known as the "Pilula cathartica vegetabilis" (see Colocynth). After the bowels have been well emptied by this pill we can often regulate them by cascara sagrada with or without other laxatives, and by prescribing a proper diet and exercise.

In the flatulence of old persons associated with constipation a little asafœtida or capsicum should be added to the pill of aloes just named.

In some instances constipation arises from reflex irritation or from ovarian or bladder trouble or from chronic lead poisoning. This form of constipation may resist all purgatives and yield to opium or to tobacco, which quiets reflex action. Tobacco depresses the inhibitory nerves of the gut, and devotees of the "weed" often use it as a laxative.

The employment of enemata as a routine practice is to be discouraged. In cases where it is necessary to use them for temporary relief and to get rid of flatulence, a little soap, common salt, or a few drops of turpentine may be added to the water. Recently the injection of glycerin (1 to 2 ounces [32.0–64.0]) has been largely resorted to, either pure or diluted one-half, and this method has been improved upon by the use of glycerin suppositories containing many drops of the drug. Glycerin acts in these cases as an irritant to the mucous membrane, and causes secretion by this means and by its abstraction of water from the tissues by reason of its hygroscopic powers. It is capable, however, of causing a good deal of rectal irritation in some persons.

CORNS.

These troublesome formations are best treated by the use of salicylic acid, the following formula being applied night and morning for several days, after which the part should be well soaked in hot water, when the entire corn will readily come away, or in some cases several attempts will be necessary:

℞.—Acid. salicylic.	gr. xxx (2.0).
Extract. cannab. indicæ	gr. x (0.65).
Collodii	f℥ss (16.0).—M.

S.—Apply with a camel's-hair brush.

The same acid may be used in alcohol, and lactic acid in the same proportion is often of service.

In the so-called "soft corns," with much inflammation, the foot should be washed and dried, and a saturated solution of nitrate of silver, 60 grains (4.0) to 2 drachms (8.0), applied to the part every four or five days.

CORYZA (ACUTE).

The treatment of coryza of the acute variety, the form which most frequently presents itself to the physician for relief, is followed in many instances by such marked amelioration of the symptoms and shortening of the attack as to encourage medical interference. It must be remembered, however, that the duration of the condition before the patient presents himself has much to do with the prognosis, for if the tissues of the nasal chambers have become boggy and swollen with exudation recovery must be more prolonged than if remedies are applied in the early stages of the catarrhal process. The treatment locally consists in the following measures for relief: By means of a medicine-dropper or an atomizer a few minims of a 4 per cent. solution of cocaine are dropped into the nostrils, the patient's head being well tipped back. After the peculiar constringing influence of the cocaine has shrunken the congested mucous membrane, so that the patient can draw air through the nostrils, the nasal chambers should be washed clean of mucus by means of the following lotion in an atomizer:

℞.—Sodii chloridi	gr. xv (1.0).
Acid. boric.	gr. x (0.65).
Sodii borat.	gr. x (0.65).
Aquæ dest.	f℥iij (96.0).—M.

The parts being thoroughly cleansed, a fine spray of the following should be used as antiseptic, sedative, anæsthetic, and protective:

℞.—Menthol	gr. viij (0.5).
Camphor	gr. v (0.3).
Albolene	f℥j (32.0).—M.

In this prescription the menthol exerts an anæsthetic effect, and prolongs the constriction of the parts produced by the cocaine, so avoiding the secondary capillary dilatation due to that drug. The camphor exercises its well-known soothing influence, and the albolene protects the membrane from dust and irritants. If the congestion has a tendency to return, it is well to use a solution of antipyrin, 2 to 4 grains to the ounce (0.1–1.2 : 32.0) of water, as a spray to prolong still further the effect of the cocaine. The albolene spray should follow, not precede, the antipyrin, as the oil would prevent the antipyrin from acting. Under no circumstances should the antipyrin be used without the cocaine preceding it, as the pain is too severe.

The internal treatment consists in the very beginning of the attack in the use of the formula for this purpose composed of belladonna, camphor, and quinine, and recommended in the article on Camphor. A hot foot-bath, with mustard in it, and the taking of a hot drink, such as lemonade with whiskey in it, on going to bed, are useful. Often 20 or 30 drops (1.3–2.0) of sweet spirit of nitre added to this drink will increase its diaphoretic effect. In other cases, particularly in strong, hearty men, 5 to 10 grains (0.3–0.65) of Dover's powder at bed-time will be better. This line of treatment is of little value after secretion has been fairly established, and in its place supportive measures are indicated. Small tonic doses of quinine, 2 to 4 grains (0.1–0.2) three times daily, sometimes combined with the use of 5 to 10 grains (0.3–0.65) of chloride of ammonium, as prescribed in the article on Bronchitis, are useful. Where much headache is present full doses of the bromide of potassium or sodium are to be given, and the spray treatment already named is to be persisted in while the attack lasts.

CROUP.

(See DIPHTHERIA.)

CROUP (SPASMODIC).

As this is a spasm of the glottis depending for its causation upon catarrh of the mucous membrane of the larynx, and as it is due most commonly to some reflex irritation, such as dentition, indigestible food, or sudden atmospheric changes, the treatment is both prophylactic and curative. Prophylaxis consists in the avoidance of cold, the use of a simple diet, particularly at the evening meal, the rendering of the air of the bedroom moist by means of steam or at least by the avoidance of dust-laden, furnace-heated air, and by the removal of dental irritation and nasal hypertrophies, which make the child a "mouth-breather." Small doses of the bromides, chloral, belladonna, or opium may be resorted to at bed-time. A very useful prescription for this purpose is that which follows:

℞.—Sodii bromidi . . . . ʒj (4.0).
Syrupi lactucarii . . . . f℥ij (64.0).—M.
S.—Teaspoonful to a dessertspoonful (4.0–8.0) on going to bed, and once or twice during the night if needed.

When the attack is present a cold cloth should be wrapped about the neck and the child placed at once in a hot bath, the air of the room being moistened by the steam escaping from a kettle of boiling water or by pouring water upon unslaked lime. If the paroxysm is very severe, a few whiffs of amyl nitrite may be employed, or antimonial wine in the dose of 2 drachms (8.0) may be used to cause vomiting. It is also useful to disseminate the fumes of menthol through the air of the room by heating some crystals in an iron spoon. If the fumes are strong enough to produce a distinct odor, they are present in sufficient amount.

The drugs first named do good by decreasing reflex excitability, while the emetics indirectly relax the spasm by the nausea and depression which they produce.

CYSTITIS (ACUTE).

If, by reason of exposure to cold, injury, the introduction of foreign bodies, such as dirty catheters, or the presence of gonorrhœa or other disease due to a septic poison, an acute inflammation of the bladder ensues, it is accompanied by a sensation of weight and vesical fulness, by pain, tenesmus, and inability to retain the urine. Sometimes the last-named condition may be reversed and retention of the urine be present.

If the general system responds to the local inflammation, as evidenced by increased arterial excitement and fever, aconite in full doses of the tincture should be used, and it should be combined with small amounts of sweet spirit of nitre and citrate of potassium, as follows:

℞.—Tinct. aconiti . . . . fʒj (4.0).
Spirit. æther. nitrosi . . . . f℥j (32.0).
Liquor potassii citratis . . . . . . q. s. ad f℥vj (192.0)—M.
S.—Dessertspoonful (8.0) every four hours until all fever ceases and the pulse is quiet.

At the same time a hot compress should be applied over the bladder, but it should not contain turpentine or any irritant substance which may be absorbed from the skin and when eliminated by the kidneys irritate the bladder-walls. Leeches may be placed upon the perineum or cups applied to the region of the sacrum. In some cases belladonna may be used with or without aconite in the dose of 5 to 10 drops (0.65) of the tincture three times a day, and it is worthy of note that this drug is particularly serviceable in the cystitis due to cold; 5 drops of liquor potassa every four hours may be substituted for the citrate of potassium, or the acetate of potassium may be used. If there is much pain and bearing-down, an enema of 30 drops (2.0) of laudanum in 2 ounces (64.0) of starch-water may be employed, or the opium may be given in suppository.

Sometimes a belladonna suppository is of more service, and an iodoform suppository will often relieve the pain by its local anæsthetic effects. Hot enemata, without any drugs, are often valuable as a means of relief, and a hot sitz-bath is very efficacious. Cannabis indica, if an active preparation can be had, is better than opium to relieve the pain, since it seems to affect the bladder favorably. The other curative measures are hygienic, and consist in the maintenance of the recumbent posture, absolute physical and mental rest, the avoidance of all foods which are stimulating, as rare meats and highly-seasoned dishes, and abstinence from all varieties of alcoholic beverages.

Should the inflammation be severe enough to become purulent, the physician should order salol in the dose of 10 grains (0.65) three times a day. This drug, being broken up in the bowel into carbolic acid and salicylic acid, is so eliminated that it renders the urine antiseptic.

Laxatives are to be employed with persistence if the bowels are confined, and salines in the early stages are generally better than vegetable purges.

Quinine should not be used against the fever, as it is contraindicated, owing to its irritant effects upon the bladder.

CYSTITIS (CHRONIC).

The treatment of chronic cystitis is entirely different from that of the acute form, and consists in the use of remedies which will stimulate the diseased mucous membrane, cause a normal secretion of mucus, and so influence the urine that the mucus already formed will be passed out and the fluid rendered alkaline or acid, as may be desired. When the secretion of mucus in large amount is persistent, the urine should be rendered alkaline by the use of liquor potassa or the citrate. The bitartrate of potassium, unlike the other vegetable salts of potassium, such as the acetate or bicarbonate, is eliminated as the bitartrate of potassium, and, as it is acid, cannot be employed.

We acidify the urine when it is necessary to dissolve the phosphates and to prevent deposits in the bladder and elsewhere. The two best drugs for this purpose are boric acid in the dose of 5 to 10 grains (0.35–0.65) or benzoic acid in the same amount. Both of these may be given in pill form, made by adding a little glycerin. The rule may be laid down that if the urine is high-colored and is strongly acid, alkalies are useful; whereas if it is light in color, but loaded with phosphates, the acids named should be employed. Salol may be given to prevent decomposition of the urine.

One of the best measures for the relief of chronic cystitis is to irrigate the bladder daily with pure warm water or water containing bichloride of mercury in the proportion of 1 : 10,000, as this washes away all mucus and uric-acid deposits and prevents irritation. Solutions of nitrate of silver have been used with great success where the urine is muco-purulent, and Thompson recommends the use of a solution of the strength of 1 grain to 4 ounces (0.05 : 128.0) of water, gradually increased to 2 grains to the ounce (0.1 : 32.0). Others, such as Gardner, Richardson, and Potter, recommend the use of stronger solutions, 5 grains to the ounce (0.35 : 32.0) of water, claiming that while these amounts may produce serious effects in some instances, they are very efficacious in obstinate cases. The physician should have at hand a solution of common salt, which he should inject into the bladder at once if the effect of the silver solution is too painful or seems excessive. This treatment is only suited to the most chronic cases.

The remaining remedies which are employed internally in chronic cystitis are those which are directed to the improvement of the mucous membrane of the bladder, and consist of buchu in the form of the fluid extract in the dose of ½ to 1 drachm (2.0–4.0), well diluted; arbutin or ursin, 3 to 5 grains (0.25–0.35); or the fluid extract of uva ursi, dose 30 drops to 1 drachm (2.0–4.0). All of these are better fitted for the treatment of subacute than chronic cystitis, as they are not sufficiently active for the chronic forms.

In cystitis of a very chronic type, with great vesical atony, strychnine is of service, and drop-doses of tincture of cantharides do great good. Turpentine may also be used with advantage in 5- to 20-drop (0.3–1.3) doses, as may also the oils of eucalyptus, sandalwood, cubebs, and copaiba.

All these measures are suitable for the treatment of cystitis in the male and female, but it is to be noted that injections into the female bladder are made much more readily than into that of the male, because of the shortness of the female urethra. In either case the operation is best performed by attaching a small funnel to a soft-rubber catheter and filling the bladder by raising the funnel when full of water above the patient's belly. Creolin has been highly recommended by Parvin in the strength of from 1 to 2 per cent. with water. The irrigation is to be performed every twenty-four hours.

DIABETES INSIPIDUS.

Diabetes insipidus exists simply as a profuse urinary flow dependent upon some disorder of the innervation of the kidney or upon atony or relaxation of this organ. Its treatment consists in the use of astringents and tonics, and in some cases in the employment of opium or belladonna, particularly if the over-secretion rests upon nervous irritability. Gallic acid may be used in 20-grain (1.3) powders three times a day, and the fluid extract or wine of ergot is often of service given in the dose of 30 drops to a drachm (2.0–4.0) of the former or a wineglassful (32.0) of the latter. As tonics the sulphate of iron and strychnine are indicated.

DIABETES MELLITUS.

In the treatment of this affection it should be remembered that it is the result of disordered function, and is not a disease in itself, but a symptom of several disease-processes. For this reason a remedy which succeeds in one case may fail in another.

The treatment of diabetes mellitus is dietetic and medicinal. The diet-list should consist largely of meat, particularly of meat with fat attached to it, as the fat, to some extent, takes the place of starch in the nutrition of the body. The avoidance of starches of all kinds and the use of dry wines or those containing little or no sugar are to be insisted upon. Beers and malt liquors must be forbidden. According to some authorities, the patient should be placed in bed and put on a purely milk diet, generally of skimmed milk, although buttermilk is better than any other form, owing to its lactic acid and lack of sugar. Koumyss for the same reason is very valuable. The chief aim of the patient must be to avoid all substances which can be readily converted into sugar by the organism.

The following list of foods and drinks may be taken, and the second list forbidden:[1]

Meats of all kinds (except liver), eggs, fish, cheese, butter, and cream; oyster-plant, asparagus (?), tomatoes, almonds, pecan nuts, butternuts, walnuts, and cocoanuts; string-beans, beet *tops*, radishes, mushrooms, lettuce and water-cress, cauliflower, spinach, and onions. Celery and cucumbers may also be permitted.

Of the foods and drinks to be avoided, we have all forms of sugar, all forms of starch, such as ordinary flour, cornmeal, arrowroot, sago, tapioca, oatmeal, barley, carrots, beets, parsnips, pie-plant, peas and beans, chestnuts, and most of the fresh fruits, cider, beers, champagne, sweet wines, and honey.

The treatment of diabetes by drugs is varied by the condition of the patient, the cause of his disease, and the quantity of sugar in the urine. While the drugs most commonly employed are used in many instances without any knowledge of how they act, and have each of them a set of warm supporters among prominent authorities, much of the treatment must depend upon whether or not a rheumatic or gouty taint is the cause of the trouble, or whether it is due to high living, little exercise, producing a plethoric, congested, overloaded system. In the first class of cases iodide of potassium and the salicylates will be most serviceable; in the second class, a restricted diet, moderate exercise, and purgation to relieve engorgement of the hepatic and gastric veins may be needed. In the cases of gouty diabetes, where relief does not follow the use of the iodides and colchicum, resort must be had to arsenic and lithium citrate or carbonate, a combination peculiarly adapted to such a condition, according to several authorities. Indeed, arsenic is a sheet-anchor with many practitioners in all forms of diabetes, and should be given in fairly large, constantly-repeated doses for a long time. A very much larger body of medical men rely on opium or one of its alkaloids, such at morphine or codeine. The former is used in the dose of ¼ to ½ grain (0.015–0.03) three times a day; the latter, 1 to 5 grains (0.05–0.3) three times a day, and the writer has found them very useful. The morphine is by far the most powerful for good. Patients who are diabetic must take large ascending doses of opiates, which they bear very well. The chloride of gold and sodium ($\frac{1}{10}$ grain [0.006]) has been highly recommended by Bartholow, and ergot by Wood and DaCosta. In cases depending upon rheumatism the use of salicylic acid is often of great value, the dose being 10 to 15 grains (0.65–1.0) three times a day.

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[1] It is worthy of note that certain persons having a slight glycosuria without serious injury, waste under a limited diet, and require ordinary fare to support the body plus the diabetic drain.

In cases of diabetes in which diet will control the disease the best clinicians insist that drugs should be avoided, for when opium or any of its alkaloids are used it is necessary to give rapidly-increasing doses, which finally become enormous, as much as 7 grains (0.6) of morphine a day being taken by some persons. Once having begun the use of drugs in severe cases, it is very dangerous to stop them, for clinical experience has shown that many of these patients waste rapidly and generally break down when this is done. In regard to the time of day at which to give the morphine or codeine, they are generally given about one hour after meals. Under these circumstances the drugs seem to decrease diuresis more than if the dose precedes the meal; further than this, the stomach is not disordered. In some cases results will be obtained from opium when its individual alkaloids fail. Careful observation of the patient should be carried out to determine the proper beginning and subsequent doses, and if at first the opiates fail to give relief, discouragement should not be felt.

Jambul is a remedy which has been widely used by clinicians for the relief of diabetes with such varying results that its position in therapeutics is uncertain. This is probably because it is effective in one form of diabetes and not in another, and we are unable to make the clinical distinction. Jambul is used in powder or the powder is placed in capsules or pills. The dose is 5 to 30 grains (0.3–2.0) once to thrice daily, and gradually increased. As much as an ounce (32.0) has been given in twenty-four hours. This medicament is said to be advantageously combined with a pure meat diet in diabetic cases.

The excessive thirst of diabetes can be best allayed by the use of acidulated water or alkaline waters containing non-purgative salts. It is useless to cut off the water-supply, to the production of great suffering, but the patient should use moderation in drinking so far as possible.

The wasting coming on in diabetes is to be treated by careful diet, rest, and the supply of all the food which the patient can digest. In many instances the amount of aliment ingested is extraordinarily large, while in others digestion is so impaired that food cannot be taken.

If cachexia comes on, iron, strychnine, bitter tonics, and the lactophosphates of lime and sodium are to be used to support the circulatory and nervous systems. Tea and coffee and all forms of food needing sweetening may be rendered palatable by the use of saccharin or of glycerin. The former passes through the body unchanged; the latter increases the glycogen in the liver, but checks the formation of sugar (Ransom).

Unfortunately, we have no positive knowledge as to the minute and innermost causes of diabetes, and in consequence cannot explain the manner in which opium, codeine, or other drugs produce relief.

Diabetic coma is a most dangerous complication of this disease, and should be treated as actively as our knowledge of its cause permits. It is thought by some that the symptoms are entirely dependent upon the presence in the blood of oxybutyric acid, and that hypodermoclysis or the intravenous injection of normal saline solution (7 : 1000) should be resorted to. Stadelman insists upon the employment intravenously of 150 cc. of normal salt solution to which 7.2 gm. of sodium carbonate and 4.6 gm. of sodium bicarbonate have been added. The injection is continued until the urine is alkaline. Unfortunately, the statistics of this method of treatment are not good so far as permanent recovery is concerned, but some form of transfusion should be used. (See Transfusion.) Hypodermic injections of ether should be resorted to to support the heart.

DIARRHŒA AND DYSENTERY.[1]

Diarrhœa is a term loosely applied, perfectly correctly, to all forms of intestinal disturbance accompanied by the passage of liquid stools, and its meaning, "to run through," expresses the state it represents.

The treatment of each form of diarrhœa depends upon its cause, and no case can be intelligently treated in which the physician fails to recognize this aspect of the case. Diarrhœa is but a symptom, not a disease, and must be regarded solely as an evidence of intestinal disorder.

While the same drugs are prescribed in many forms of the trouble, we may divide cases of diarrhœa into four classes, as follows: (*a*) Those in which the laxity is due to a catarrh, acute or chronic, of the intestinal mucous membranes, causing the passages to contain mucus; (*b*) those where, owing to disordered innervation, a profuse outpouring of liquid takes place from the blood-vessels into the intestinal lumen; (*c*) those in which, owing to disease, the glands fail to prepare juices to digest the food properly; and, finally (*d*) those cases where ulceration causes irritation and bloody purging.

The treatment of the catarrhal form first named consists primarily in the regulation of the diet, which should be made up chiefly of milk, boiled or predigested, or of milk whey, and in the administration of castor oil or other mild purge, such as sulphate of magnesium, to sweep out fermenting food and mucus. Enough laudanum should accompany this oil to prevent griping, and it is well to add bicarbonate of sodium, grains 20 to 30 (1.3–2.0) to the dose, both to aid the action of the oil and to render the bowel alkaline in reaction (normal) instead of acid, as caused by the fermentation abnormally present. A mustard plaster or other counter-irritant should be applied to the abdomen. Often in the milder forms of mucous diarrhœa this is all that is needed, but more frequently it must be followed by the use of tonics and astringents, such as nitrate of silver and hyoscyamus, in the following pill:

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[1] The articles on Cholera, Cholera Morbus, and Cholera Infantum should be carefully read in connection with this article.

℞.—Argenti nitratis . . . . gr. ij (0.1).
Extract. hyoscyami . . . . gr. v (0.3).—M.
Ft. in pil. No. x.
S.—One three times a day.

Or,

℞.—Plumbi acetatis . . . . gr. ij (0.1).
Extract. opii . . . . gr. ij (0.1).—M.
Ft. in pil. No. x.
S.—One three times a day.

If these stop the diarrhœa, yet there still seems to be a tendency for it to return or atony is present, we should use a pill containing the extract of chiretta or employ nitromuriatic acid, or, better still, dilute nitric acid and compound tincture of cardamoms, because the constant tendency to relapse indicates a deficient secretive action on the part of the intestinal glands, which these remedies are prone to improve:

℞.—Acid. nitric. dil. . . . . fʒj (4.0).
Tr. cardamomi comp. . . . . f℥ij (64.0).
Tr. gentian. comp. . . . . f℥ij (64.0).—M.
S.—Dessertspoonful (8.0) every four hours.

If the catarrhal state is persistent, no remedy compares to the chloride of ammonium, dose 5 grains (0.3) every four hours in liquorice and water. Where the catarrhal state is exceedingly chronic and obstinate it is well to employ 3- to 5-grain (0.15–0.3) doses of potassium iodide.

If the pills already named do not control the diarrhœa, and the discharges are so profuse as to weaken the patient very greatly, the following prescription may be used to check the movements, but not to stop them completely:

℞.—Acid. sulph. aromat. . . . . fʒjss (6.0).
Spt. chloroformi . . . . fʒij (8.0).
Tr. opii camphorat. . . . . f℥ij (64.0).
Syr. zingiberis . . . . q. s. ad f℥iv (128.0).—M.
S.—Dessertspoonful (8.0) every two hours.

Or,

℞.—Tr. kino . . . . f℥j (32.0).
Tr. catechu comp. . . . . f℥j (32.0).
Misturæ cretæ . . . . f℥iij (96.0).
Aquæ cinnamomi . . . . . . q. s. ad f℥vj (192.0).—M.
S.—Shake well before using. Tablespoonful (16.0) every three hours.

In many cases where the condition of mucous diarrhœa becomes chronic it is necessary to resort to enteroclysis (Part III.) and the treatment needed in cases of chronic intestinal catarrh. (See Diarrhœa, Chronic.)

In the second form of diarrhœa named—that in which serous or watery purging is present—the treatment is radically different. In these cases the blood-vessels of the gut are relaxed and leaking, and must be contracted and made water-tight. This dilatation may result from fear ("nervous diarrhœa"), from exposure to cold, or from exhaustion, extreme heat, and irritant food. If from irritant foods, they are generally swept out in the first flush of liquid.

The measures to be adopted consist in those directed to the contraction of the dilated and relaxed blood-vessels and the restoration of the proper nerve-supply to the parts.

As the splanchnic nerves are the vasomotor nerves of the intestine as well as the inhibitory nerves of peristalsis, it is evident that we must use drugs which will cause stimulation of these fibres, and the chief of these is found to be opium, which diminishes intestinal peristalsis and secretion by just such an influence. In the same way small doses of volatile oils are of service, and camphor and spirit of chloroform may be used. As there is relaxation, astringents are indicated; and as sulphuric acid is not only astringent, but eliminated by the lower bowel, it is peculiarly serviceable. We find, therefore, that the following prescription fulfils every indication:

℞.—Acid. sulph. aromat. . . . . f℥ss (16.0).
Olei cajuputi . . . . gtt. xl (2.65).
Ext. hæmatoxyli fl. . . . . fʒij (8.0).
Spt. chloroformi . . . . fʒj (4.0).
Syr. zingiberis . . . . q. s. ad f℥iij (96.0).—M.
S.—Teaspoonful (4.0) in water every two or three hours.

If desired, kino or catechu may be used in lieu of the hæmatoxylon, or the oil of cloves substituted for that of cajuput. Camphor or paregoric may also supplant these drugs.

In some instances these attacks appear to depend upon hepatic disorder, and the only cure, aside from partial relief, is to be obtained by the use of 2 to 6 grains (0.1–0.35) of mercury with chalk (hydrargyrum cum creta) or calomel, given in ⅛ to ½ grain (0.01–0.03) doses. What is said of intestinal disorder from lack of secretion under the heading of Cholera Infantum applies very forcibly to these cases, and diarrhœa may persist for weeks, or only temporarily be held in check by the most powerful drugs, until the physician thoroughly flushes the intestine with bile by the use of podophyllin and calomel.

Wood has highly recommended the use of a bismuth powder containing a drop or two of carbolic acid.

For the purpose of establishing intestinal antisepsis, carbolic acid may be used, and naphthalin, thymol, and other drugs of this class have been employed, particularly salicylic acid. None of them compare with carbolic acid, however, which should be used in 1-drop (0.05) doses on bismuth or in water. When the carbolic acid is given to a child, it is best prescribed in such a way that in each teaspoonful a half-drop is present. This teaspoonful of liquid should be placed in a tablespoonful of water. In other cases sulphocarbolate of zinc in the dose of from 1 to 4 grains (0.05–0.2) in powder or capsule is beneficial. Salol combined with chalk mixture may also be advantageously used. (See prescriptions under Salol.)

Sometimes a good-sized, brisk purgative dose of calomel followed by a saline does good in these cases if they are strong enough to permit of its use.

The regulation of the diet, which should consist in sterilized milk or koumyss, the former being predigested, is of the greatest importance. Should the patient be a bottle-fed baby, the proportions of the milk, water, and cream placed in the bottle should be varied until a mixture is formed which is exactly fitted to the digestion of the case.

The after-treatment consists in the use of tonics and a carefully regulated diet, which should be largely composed of milk and milk foods.

The third class of cases consists chiefly of children who pass fœtid, "mousy"-smelling stools in summer diarrhœa, with green, spinach-like masses of semi-digested food or distinct lientery. They may be due to deficient glandular action in any part of the alimentary canal, and are often cured by the use of pepsin and hydrochloric acid to aid the gastric processes. In other instances the duodenum is at fault, and should be stimulated by small doses of nitromuriatic acid, or by podophyllin in the dose of $\frac{1}{50}$ to $\frac{1}{40}$ of a grain (0.001–0.0015), with a little milk-sugar, or given in alcoholic solution. Similarly, ipecac in powdered form may be used in the dose of $\frac{1}{4}$ to $\frac{1}{2}$ a grain (0.015–0.03) three times a day. In the case of children who are often sufferers from rickets, phosphate of sodium, lime salts, and common salt should be freely given. (See Cholera Infantum.)

The fourth type, generally known as dysentery, is due in some cases to hepatic trouble, in others to the drinking of impure water, and in the third place to exposure to heat and the use of bad food. It is in most cases a very obstinate form of diarrhœa, requiring much skill and patience for its cure. In the chronic forms deep ulcers may exist; even in the milder cases a high inflammation is often present.

In those cases which are due to exposure to heat and hepatic trouble there are two remedies which are far above all others in value and should always be resorted to. The first of these is ipecac, the second is calomel.

The ipecac should be used in a special manner to be effective (see Ipecac), and the calomel should be used in full purgative amounts, but is contraindicated if much weakness is present.

If the passages are slimy and bloody, $\frac{1}{200}$ of a grain (0.0003) of bichloride of mercury every hour or two is of service, and if much blood is present high rectal injections of the distilled extract of hamamelis and water half and half are of value. In some forms of dysentery due to acute inflammation large enemata of iced water are of the greatest value. The water should be ice-cold, and at least a quart injected by hydrostatic pressure. This method can only be used in strong persons, and is very useful in that it also aids in reducing any fever which may be present. The following mixture may be injected into the bowel in place of cold water in feeble cases:

℞.—Sodii boratis	ʒj (4.0).
Tinct. benzoin.	fʒj (4.0).
Spt. camphoræ	f℥j (32.0).
Aquæ ferventis	Oij (1 litre).—M.

If the ulcers are very old and chronic, nitrate-of-silver injections of the strength of 10 to 20 grains (0.65–1.3) to the pint (500 cc.) of water may be employed in large bulk, a salt solution being at hand for the destruction of the silver salt if the local action which ensues is too severe.

Recently the injection of water or medicaments into the bowel for the purpose of influencing the intestinal wall has given way in the hands of prominent physicians to irrigation by means of an inlet and outlet tube. The inlet tube should be attached to a fountain syringe, and the outlet tube be long enough to reach to a vessel by the side of the bed and of sufficient calibre to carry off flaky mucus. In many cases of dysentery of a mild form rectal irrigation will suffice, but if the entire colon is involved larger injections are necessary. The irrigation should be continued until the returning fluid becomes perfectly clean and free from foreign particles. If the bowel movements are very frequent, the injections may be made every three hours. Probably the best solution to employ for irrigation where much mucus and pus is present is one composed of bichloride of mercury, 1 : 5000. When this is used, a pure water injection or one of 1 : 30,000 should follow it, in order to prevent absorption of the mercury into the system. If for any reason the effect of the bichloride is feared, boric acid may be used in the proportion of 1 drachm (4.0) to the pint (500 cc.), or 15 grains (1.0) of sulphocarbolate of zinc added to 1 quart (1 litre) of hot water be injected. If the dysentery is due to the amœba coli large rectal injections of a solution of quinine in the proportion of 1 to 3000 should be used, as this drug destroys that organism. (See Enteroclysis in Part III.)

Tannic acid is an intestinal antiseptic, and can be employed in the strength of 1 drachm to the pint (4.0 : 500 cc.) for irrigation purposes.

DIARRHŒA (CHRONIC).[1]

This is one of the most obstinate conditions which the physician is called upon to treat. It may be due to nervous irritability of the bowels, so that the entrance of food or drink sets up an excessive peristalsis which so hurries the food and drink through the alimentary canal that digestion and absorption are only partly performed. Chronic diarrhœa may also be due to chronic intestinal catarrh, to ulcerations of the small or large intestine, as after typhoid fever, or to rectal disease, which reflexly causes hyperperistalsis. Fissure of the anus often causes persistent diarrhœa by reflex irritation. In those cases due to hyperperistalsis an advantage is often gained by directing the patient to take as little liquid as possible, particularly at meals, and to avoid coffee or other stimulants to reflex activity. Highly-seasoned foods are also to be avoided. Meats should be preferred to vegetables, and an absolute peptonized milk diet may be ordered, the milk being given in tablespoonfuls every few minutes, rather than in large amounts, at meal-times if the patient will remain in bed. Counter-irritation, constant and as severe as the patient can stand, should be used over the abdomen. Suppositories and rectal injections seldom benefit this class of cases, but a pill composed as follows may be useful:

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[1] Read with this article those on Diarrhœa and Dysentery and Enteroclysis.

℞.—Argent. nitrat. . . . . gr. iv (0.2).
Ext. hyoscyam. . . . . gr. x vel xxx (0.65–2.0).
Ext. opii . . . . gr. ij vel iv (0.1–0.2).—M.
Ft. in pil. No. xx.
S.—One one hour before a meal.

In other instances some of the astringent prescriptions given under the article on Diarrhœa are better than the above. In the cases due to ulcers of the rectum injections of nitrate of silver 2 grains to the ounce (0.1 : 32.0) are of value, particularly if followed by a 5- or 10-grain iodoform suppository. Operative procedure against anal fissure will often cure a diarrhœa due to this cause. The cases due to intestinal catarrh are benefited by the use of full doses (5 to 20 grains [0.3–1.3]) of bicarbonate of sodium by the mouth and the use of iodoform suppositories, which not only relieve the rectal irritation nearly always present, but exercise the peculiar effects of iodine upon the catarrhal process. In cases of so-called morning diarrhœa abstinence from liquids before going to bed the night before and a very dry and small breakfast are to be strongly recommended, with rest in bed during the morning hours.

Rockbridge Alum water, which contains iron and alum, is useful in cases of diarrhœa with anæmia.

DIPHTHERIA AND MEMBRANOUS CROUP.

Diphtheria is at first a distinctly local disease, the membrane in the throat forming a nidus from which the entire body ultimately becomes poisoned by the micro-organism peculiar to the malady. While it is true that in some cases of membranous pharyngitis or laryngitis the true Klebs-Loeffler bacillus cannot be found, it is a fact that all cases should be treated identically as if they were true diphtheria.

The best local application to the throat is peroxide of hydrogen. A cotton swab should be soaked with the undiluted 10 or 15-volume solution and pressed against the mucous membrane which is diseased, or, if this cannot be done, a spray, from a glass atomizer, of the strength of 1 : 4 of water may be employed. The effect is often extraordinary. After a few applications the false membrane appears to exist only in disorganized shreds. If the nasal chambers become affected, a solution of ordinary salt (7 : 1000) should be used in a spray or by means of a fountain syringe. The child is placed with its hips on the lap of one nurse and its head on the lap between the knees of another, the dress of the nurse being protected by a rubber sheet, and the nasal cavities irrigated. The position of the child should be on its side, not on its back, and the face should be turned down sufficiently to allow the liquid to freely escape, the child breathing through its mouth. The applications should be made as frequently as the membrane forms.

Mercury is very useful in full doses in diphtheria in sthenic persons, and the bichloride may be given by the mouth in doses of $\frac{1}{50}$ grain (0.0013) every hour until the stools are loose or signs of ptyalism appear. Tincture of the chloride of iron, quinine, and strychnine are of service to keep the kidneys active, to stimulate the heart and respiration, and to support the vital forces. The dose of the tincture of iron may be as much as 2 drops (0.1) every hour to a child of four years. The food of a child during an attack of diphtheria should be plentiful and consist of pancreatized and sterilized milk. It is best to use throat applications before giving the food, in order to avoid vomiting.

A method of using turpentine by inhalation is highly recommended by J. Lewis Smith. The following prescription is placed in water in the proportion of 2 tablespoonfuls (32.0) to a quart (1 litre), and this mixture is then placed on a gas or oil stove in a broad open vessel and allowed to boil constantly. The air of the sick-room is soon laden with the vapor, which is not offensive. The prescription is as follows:

℞.—Acid. carbolici }
Olei eucalypti } . . . . āā f℥j (32.0).
Spt. terebinthinæ . . . . f℥viij (256.0).—M.
S.—Use as directed. Label: Poison if taken internally.

In other cases there is no doubt that calomel by sublimation does great good. The child is placed in a bronchitis tent and from 3 to 5 grammes of calomel are placed in a sublimator and vaporized into the air the child breathes.

When the glands of the neck threaten to suppurate, ice-bags should be applied to the throat and pieces of ice held constantly in the mouth, while the tincture of iron is pushed in as full amounts as possible.

If suffocation is imminent, inhalations of oxygen are to be used and atropine or strychnine employed, but tracheotomy or intubation is usually the safer plan of treatment.

Chlorate of potassium must never be given internally, as the kidneys are already severely inflamed, and this drug is not only useless when so given, but is in addition a renal irritant. Although the author has been criticised for this last statement, he is convinced of its truth; and that he is not in error is proved by the fact that no less eminent authorities than H. C. Wood and J. Lewis Smith agree with him.

Antitoxin Treatment.—This treatment supplants all others in efficacy and usefulness, and should displace all other plans of treatment when it can be used, except the local applications. Of the extraordinary advances made in pathology and therapeutics, the introduction and proof of the value of antitoxin in cases of diphtheria is perhaps most worthy of note. Before we glance at this method of treatment, let us understand the basis upon which it rests. It being universally admitted that the bacillus of diphtheria, by its local growth, produces toxins which, when carried in the blood or lymphatics, destroy the functional and organic life of the vital tissues, it is at once evident that in the body of the patient there must be two processes looking toward its own protection. The first is the effort at elimination on the part of the emunctories; the second is a hypothetical process—namely, that the tissues and liquids of the body contain, or at once manufacture, an antitoxin, the effects of which are directly antagonistic to the toxin of the disease. Although vital resistance consists in far more than this simple and single method of defence, it suffices at present to discuss only this part of it. If the tissues can form enough antitoxin to protect the organism, the patient recovers; if they fail, either because they are feeble or because the dose of the toxin is overwhelming, the patient dies. In the case of diseases, such as scarlet fever and small-pox, which rarely attack the same person twice, it perhaps may be said that immunity is conferred by the tissues being trained or educated, as it were, to prepare antitoxin in such large amounts when called upon that the entering wedge of a new attack is snapped off at the moment it begins to enter the field. While we rest this view of the case upon hypothesis, it furnishes us with a result which enables us to base the new treatment upon rational lines; and it would seem probable that the ability to develop large amounts of antitoxin possessed by certain animals, added to other defensive processes, renders them practically entirely immune from any attack of the disease at any time. Thus, the goat and horse are by nature practically immune to diphtheria, while the guinea-pig, on the other hand, is peculiarly susceptible. Supposing the horse and goat to be naturally able to resist diphtheria-inoculation to the extent of almost complete immunity, it becomes necessary, in order to make the resistance of their blood-serum absolute, to stimulate, if we can use such a term, their antitoxin-preparing powers, and with this object in view injections of the toxin derived from cultures of diphtheria germs are made into the blood of the naturally immune brute. As a result, the serum of the blood of the animal possesses the power not only of resisting diphtheria poison while in its own vessels, but confers immunity of a temporary kind upon any other animal into whose body some of it is injected. It was found experimentally that antitoxic horse-serum when injected into the susceptible guinea-pig rendered that animal to a great extent insusceptible to inoculation by diphtheria. This is a very brief but perhaps sufficiently long explanation of the rationale of antitoxin treatment, which opens itself like a beautiful fan over many other diseases than the one we are discussing.

As different bouillon cultures vary in toxicity, and as the serum from the horses after treatment varies in antitoxic strength, it is necessary to determine the immunizing power of the serum from each bleeding. The serum is prepared and tested in the following manner: The least amount of a sample of filtered bouillon culture of diphtheria bacilli which is necessary to kill a half-grown guinea-pig in from three to ten days after subcutaneous injection is determined. This is then known as the minimum fatal dose of that toxin, and may vary from 0.1 c.cm. to 0.006 c.cm. The stronger toxins are to be preferred. A young healthy horse now receives 1.0 c.cm. of toxin, and this is repeated in gradually increasing doses until such time as tests of the serum from a trial bleeding show it to be of the desired quality. This treatment may take a total of from 100 c.cm. to 2000 c.cm. of toxin and cover a period of from three weeks to six months, depending upon the horse. From 600 to 1000 c.cm. of blood are then drawn from the jugular vein of the animal, and after standing the serum is taken from it and some antiseptic yet harmless drug is added to preserve it.

The antitoxic power of the serum is estimated in the number of units in one cubic centimetre. When 0.1 c.cm. of a serum is injected with ten times the minimum fatal dose of toxin and the guinea-pig is not affected by the latter, such serum is said to be "normal serum" and to contain one unit of antitoxin in each cubic centimetre. The antitoxic serum usually sold is said to contain from 100 to 500 units in each cubic centimetre, and is therefore from one hundred to five hundred times stronger than normal serum. With these serums only 0.001 c.cm. and 0.0002 c.cm. respectively are necessary to neutralize ten times the minimum fatal dose when injected with the latter into guinea-pigs.

It has been urged against serums containing over 250 units per c.cm. that their use is apt to be followed by untoward effects such as skin eruptions and local irritations. On the other hand, if the weaker serums are employed such large amounts have to be given that very considerable swelling of the area in which the injection is given is produced, and of course a large amount ot valuable time is lost before the whole dose is absorbed; whereas if serums containing high immunizing power are employed the small dose is quickly absorbed. In pressing cases of nasal or laryngeal diphtheria the stronger serums are indicated, whereas in the more moderate cases the lower grades of strength may be used. (See below.)

There are several facts in connection with the use of the diphtheritic antitoxin which should be borne in mind. The syringe for injecting it should have a glass barrel in order that any foreign bodies or air-bubbles can be seen and removed before the injection is given. The packing of the piston should be made of asbestos or rubber, since it is practically impossible to sterilize leather or other packing, and the different parts of the syringe should be easily disjointed in order to permit thorough cleansing and sterilizing. Immediately before and after the use of the syringe the needle should be removed and the cap taken off so that the sterilizing fluid may readily enter the syringe and needle, and then they should be placed in warm water which is brought to the boiling-point. By this gradual heating we avoid the breaking of the glass barrel. It is best to employ one of the syringes made for the purpose now being described. The injection is to be given slowly during a period of several minutes into any part of the body which has loose subcutaneous tissues, such as the broad of the back, the side of the abdomen, or the outside of the thigh. The skin at the place of injection should be thoroughly sterilized beforehand, and after the injection the fluid should be allowed to diffuse itself and not be spread by rubbing.

The following are the recommendations as to the manner of using diphtheria antitoxin made by the American Pædiatric Society:

"*Dosage.*—For a child over two years old the dosage of antitoxin should be, in all laryngeal cases with stenosis and in all other severe cases, 1500 to 2000 units for the first injection, to be repeated in from eighteen to twenty-four hours if there is no improvement; a third dose after a similar interval if necessary. For severe cases in children under two years, and for mild cases over that age, the initial dose should be

1000 units, to be repeated as above if necessary; a second dose is not usually required. The dosage should always be estimated in antitoxin units, and not of the amount of serum.

"*Quality of Antitoxin.*—The most concentrated strength of an absolutely reliable preparation.

"*Time of Administration.*—Antitoxin should be administered as early as possible on a clinical diagnosis, not waiting for a bacteriological culture. However late the first observation is made, an injection should be given unless the progress of the case is favorable and satisfactory."

The dose of antitoxin serum is to be judged by its known strength or power of conferring immunity and *by the severity of the disease and the susceptibility of the patient.* At present the common dose of the ordinary antitoxin serum of Parke, Davis & Co. is 1 to 5 cubic centimetres.

The general trend of professional opinion the world over is strongly in favor of the use of antitoxin in diphtheria. So far there have been published an immense number of reports and statistics concerning its use. Of these, two in particular are so exhaustive as to be conclusive. One gives the statistics of the mortality of diphtheria with and without antitoxin in hospital practice, the other the results in private practice. Thus in hospitals Welch shows that out of 7166 cases treated with antitoxin only 17.3 per cent. died, whereas under the old treatment it is calculated that 42.1 per cent. would have died. Again, in Paris during one epidemic 300 cases were treated with serum with a mortality of 26 per cent., while in another hospital in which no serum was employed the mortality during the same period was 60 per cent. In another instance, that of Baginsky, the mortality of one epidemic, which was 15.6 per cent. during the use of antitoxin, increased to 48.4 when no antitoxin could be had.

The report as to the results in private practice, compiled by the American Pædiatric Society in 1896, shows that in 5794 cases the mortality was only 12.3 per cent., although 218 cases were moribund when the antitoxin was used or died within twenty-four hours thereafter. The statistics also show that the frequency of laryngeal diphtheria is decreased by the use of antitoxin, and that the mortality of cases which have been intubated or tracheotomized is decreased by its use. Again the use of the serum decreases the time in which the tube must be retained in the throat.

The collective report made by the same society in 1897 shows that the percentage of *recoveries* in laryngeal diphtheria is now 73 per cent. as against 27 per cent. before antitoxin was used.

When the antitoxin is given general improvement usually takes place in twenty-four to forty-eight hours, and the temperature falls. The spread of the membrane is arrested and its separation soon begins.

The chief gain from its use is to be obtained very early in the disease, for after degenerative changes have taken place in the heart and kidneys the damage is done. The dose should be repeated every six to twelve hours in severe cases and doubled in amount in very malignant cases or in those with deeply seated cervical induration.

In conclusion, the author cannot too strongly urge upon the reader the vital importance of using antitoxic serum early and freely. The reports in which it has been condemned are imperfect and unreliable. Every patient who apparently suffers from the disease should receive this remedy, so potent for good and so lacking in harmful qualities even when given to non-diphtheritic persons, and the physician who can obtain the serum and does not use it is not doing the best thing for his patients.

Although the use of antitoxin for immunizing purposes has been resorted to, it is not practised by the general body of the profession to the extent that it should be.

The only new local application which promises much is that of Loeffler. He directs that the mucous membrane shall be carefully wiped off by a pledget of cotton, and after this is done that a second pledget dipped in the following solution shall be pressed against the diseased area for ten seconds at three-hour intervals: Menthol 2½ drachms (10 grammes) dissolved in 9 drachms (36 cc.) of toluol, to which is added 1 drachm (4 cc.) of liquor ferri chloridi and absolute alcohol 2 ounces (60 cc.). This solution, if kept in a dark glass bottle, well stoppered, will last for months. The author would prefer to use peroxide of hydrogen in all cases.

The local use of iodine, carbolic acid, and similar irritating and poisonous substances is not justifiable.

DROPSY.

Dropsy is to be regarded as a symptom (not as a disease in itself) which may arise from many causes, such as cardiac, pulmonary, or renal diseases, or depend upon obstruction, from various causes, to the normal flow of the blood and lymph through the vessels and tissues. Its existence is dependent upon so many causes of a still more indirect nature that it is almost impossible to notice all of them, but the following consideration of the subject will at least make clear some of the reasons for its occurrence and indicate the means which are to be taken for its relief.

At the very start we are confronted by facts which seem paradoxical, but which are in reality quite reconcilable. These are, that low arterial pressure predisposes to dropsy, and that high venous pressure does likewise, or, in other words, that the cause of exudation on one side of the circulation is its prevention on the other.

The explanation of these statements lies in a thorough understanding of the physics of the circulatory system and its anatomical structure. It will be remembered that dropsical exudation takes place from the capillaries, and that the integrity of the walls of the blood-vessels and lymphatics depends upon normal nutrition, or, in other words, upon a proper blood-supply. As a consequence, dropsy may be due to poorly-nourished vessels as much as to any other cause. Further than this, a watery state of the blood permits abnormal exudation.

The force exercised upon the column of blood as it is driven out by the heart into the aorta may be considered as the chief support of the capillary circulation, so that if the heart be weak the pressure falls in the arteries, and in consequence the rapidity of flow is decreased in the capillaries, while, on the other hand, an increased cardiac activity hastens the capillary circulation. As the arterial pressure and force depend not only upon the heart-force, but also upon the tonicity of the arteries which carry the blood-stream, it becomes evident that dilated arteries must lower blood-pressure even if the heart be strong, although practically the heart and vasomotor system generally fail or increase in tone together. We find, therefore, that a weak heart or a relaxed artery tends to cause stagnation of the blood in the capillaries, and, having found that such stagnation is productive of exudation, it is not hard to discover why low arterial pressure is a cause of dropsy.

Having shown this to be true, let us turn to an explanation of the fact that a high pressure in the veins is productive of the same changes.

Here the normal pressure is almost nothing, being much less than in the arteries, and considerably less than in the capillaries. The result of this is, that in health the blood flows rapidly from the high pressure of the arterv to the low pressure of the vein, and passes through the small veins under a gradually decreasing pressure until it reaches the heart. Any obstruction to this venous flow must increase the venous pressure, and, the venous pressure being increased, the rapidity of flow through the capillaries must be decreased. The whole subject may be made more clear by the following example:

Supposing that two iron tubes are connected at one end by several lines of rubber tubes (the capillaries), and that water is flowing into the first tube, or the artery, under a pressure which is represented by the figure 100, while the resistance to the flow in the second tube, the vein, is represented by the figure 0. It at once becomes evident that the rapidity of the flow through the connecting rubber tubes will be very great, whereas if the pressure in the first or arterial tube is decreased to 50, the rapidity is decreased to one-half, or if the pressure in the second tube be increased to 50 instead of remaining at 0, the same changes will occur; in either instance capillary flow is lessened and exudation is caused. This is the pathology of dropsy, and, having understood it, let us proceed to discover the causes of dropsy in various diseases.

In cardiac disease it is due to a weak heart being unable to supply the arteries with enough blood to maintain the normal pressure, or to a damming-up of blood in the venous system as the result of the imperfect emptying of the cardiac cavities. In the first instance low arterial pressure produces dropsy; in the second, high venous pressure has a similar effect.[1]

In renal troubles the dropsy depends more upon the lack of proper nutritive processes in the capillary walls and upon changes in the blood-pressure than upon other causes. If the kidney is diseased, it may not be able to eliminate the proper quantity of liquids, which accumulate and finally escape into the tissues, while the same failure in renal function causes disease of the blood-paths themselves, and often produces cardiac complications.

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[1] For an explanation of these changes in the action of the muscle, valves, and cardiac action in heart disease see the article on Heart Disease.

Hepatic troubles cause dropsy by producing pressure upon the large blood-vessels going to the liver, and, in consequence, the exudation is generally confined to the lower limbs and abdomen. If the hepatic trouble be severe, some failure in the nutrition of the blood-vessels and changes in the quality of the blood may ensue.

Pulmonary disease rarely causes dropsy unless the venous pressure is greatly increased and productive of cardiac dilatation, or, as in phthisis, where the changes in the nutrition of the body involve the blood-vessel walls and the blood.

Having spoken of these causes of dropsy, it remains for us to consider its treatment, which may be divided into two parts—namely, that directed to its removal after the liquid is poured out, and its relief or cure by direct attention to its causes. The means for the removal of the fluid are suitable to all cases, be the cause what it may, unless the dropsy be of renal origin. Whenever an accumulation of liquid takes place in the tissues, drugs or measures must be resorted to which will cause the emunctories of the body to get rid of it. In ascites, in particular, we may employ elaterium in the dose of $\frac{1}{6}$ of a grain (0.01), or elaterin in the dose of $\frac{1}{20}$ of a grain (0.003), placed in the mouth and washed down by a little water, or, if this is not used, the compound jalap powder may be resorted to in the dose of 20 to 30 grains (1.3–2.0), and to it may be added, to increase its efficiency, 10 grains (0.65) more of bitartrate of potassium than the official powder contains. These two remedies are particularly serviceable in renal dropsies, since the elaterium is supposed to aid in the elimination of urea by the bowel, while the cream of tartar in the jalap powder increases the action of the kidneys.

The cream of tartar is not to be employed in cases of acute nephritis.

Compound extract of colocynth may be employed in the dose of 2 to 6 grains (0.1–0.3), according to the state and idiosyncrasy of the patient.

All these remedies relieve dropsy by causing so great an outpouring of liquid from the blood-vessels of the intestine that the liquids in the tissues are taken up by the depleted blood-vessels to replace the loss through the action of the purgative. In other words, these purgatives render the alkalinity of the blood greater by concentration, and absorption of fluid occurs by reason of the following physiological and physical facts:

As is well known to every physiologist, the passage through a blood-vessel of a salt solution of less than $\frac{7}{10}$ of 1 per cent. causes an abstraction of salts from the surrounding tissues by the circulating fluid, in order that the amount of salts in the vessels and tissues may be identical. At the same time the tissues become infiltrated with liquid. On the other hand, if the solution be stronger than the normal, the liquid leaves the tissues to enter the vessels, and the tissues in consequence shrink.

When salines are given to relieve dropsy, they must be administered in concentrated or saturated solution and on an empty stomach, total abstinence from the drinking of water being insisted upon until they have fully acted, for the reasons given in the last paragraph. For this reason they should be given an hour or so before breakfast. If these directions are not followed, this method of treatment is useless.

The other means which we possess for the removal of dropsy are by way of the kidneys and skin. If the kidneys are hopelessly diseased, that pathway is almost useless, but if they are only passive or partly inactive, diuretics may be used to stimulate their secreting structure and to increase the leakage of liquid through them by increasing blood-pressure. Such patients should be placed almost entirely on a milk diet, and many of them will greatly improve under the use of buttermilk to the exclusion of other nourishment. If this cannot be taken, sugar of milk may be employed as an active diuretic. (See Sugar of Milk.)

Often the kidney will be found inactive, because, owing to congestion from cardiac trouble, it cannot act. Under these circumstances digitalis, in 5- or 10-drop (0.35–0.65) doses of the tincture, given three times a day, will be of value, and its efficacy will be increased by the addition of 1 drop (0.05) of the tincture of cantharides *if the renal lesion is exceedingly chronic or mere torpidity exists.* Digitalis and squill, in pill form, as follows, may be used:

℞.—Pulv. digital. fol. . . . . gr. xx (1.3).
Pulv. scillæ . . . . gr. xx (1.3).—M.
Ft. in pil. No. xx.
S.—One every five hours.

Or digitalis and calomel may be employed in pill form in renal and cardiac dropsies.

Caffeine is also a useful diuretic, particularly in torpidity of the kidney, as it stimulates the secretory epithelium, thus eliminating urea and other effete matters, and increases the passage of liquids by the increased blood-pressure which it produces.

That a large amount of liquid may be gotten rid of through the skin under the influence of heat is well known. (See Heat.) In addition to external heat we may use pilocarpine by the mouth or hypodermically in localized dropsies, to produce absorption and consequent elimination of liquid by sweating. No drug should ever be given hypodermically in dropsy of a general character, as it will not be absorbed from the water-soaked tissues with any rapidity, if at all.

The chief means of relief to be resorted to in cases of ascites is tapping. Efforts to remove effusions in the peritoneal cavity by medicinal measures are rarely followed by success. In reality, tapping is far less heroic treatment than purgation, and the old theory that it is dangerous has been completely disproved. It has been found that tapping not only removes the fluid, but may in some unknown manner produce a permanent cure after from one to twenty or more operations.

In performing tapping the patient is to be placed in a sitting or semi-recumbent position, and directed to evacuate his bladder, so that there will be no danger of this viscus being injured by the trocar. The skin of the abdomen in the middle line one or two inches below the umbilicus is next benumbed by salt and ice held against it. The physician then takes a trocar and canula, at least four inches long, and pushes it through the abdominal wall until by the decrease in resistance he knows its point has entered the abdominal cavity. It is well to have a broad abdominal bandage placed around the belly, so that an assistant by pulling on its ends may support the belly-walls when relaxed by the escape of the effusion. As a rule, not more than one-half or three-fourths of the liquid should be removed at one sitting, as its entire removal may be followed by collapse. The value of iodide of potassium in cases of ascites is not to be forgotten, but it must be given cautiously if renal disease is present.

Where the tenseness of the skin in the lower extremities causes danger of local sloughs, some authors recommend small punctures for the escape of the liquid, the limbs being encased in sterilized absorbent cotton to absorb the liquid. (See Acupuncture.)

DYSENTERY.

(See DIARRHŒA.)

DYSMENORRHŒA.

The existence of dysmenorrhœa depends upon so many conditions that the treatment employed in one case is seldom productive of success in the next. This is not the place for a consideration of the surgical measures adopted for the cure of this symptom, and only the medical treatment will be spoken of.

When dysmenorrhœa results from the taking of a cold, and is accompanied by uterine congestion and irritability, the following measures are particularly valuable, and may do good in many cases depending upon other causes: The patient should take a hot sitz-bath, and immediately get into bed as soon as the buttocks are dried, being well covered while in the tub and afterward by a blanket. A turpentine stupe is now to be used (see Turpentine), and 10 grains (0.65) of Dover's powder to be administered, unless some idiosyncrasy toward opium is known to exist, when a half or a fourth of this amount may be employed. Often when the attack is accompanied by constipation a purgative dose of Epsom salts or aloes is of service in the congestive forms of the disorder.

If the pain is persistent and severe, a belladonna suppository, of ½ grain of the extract, may be inserted into the rectum, or in other cases belladonna ointment smeared over the os uteri will be found of service. The latter method is generally impracticable and is rarely resorted to. Very commonly belladonna tincture, by the mouth, is of service in relaxing the spasm of the cervix and of the uterine fundus.

Some practitioners resort to the use of opium at each epoch, and keep the patient partially narcotized until menstruation is passed. This is unjustifiable and born of ignorance and bad practice, since the physician is simply dodging the trouble and predisposing the patient to future attacks by reason of the constipation and the resulting habit which is almost sure to appear after the repeated employment of opiates.

When the dysmenorrhœa is due to obstruction of the cervical canal by organic changes or flexions, these conditions must, of course, be relieved before a cure can be expected, and the medical treatment can be directed only to the alleviation of the pain. Divulsions or slow or rapid cervical dilatation should be carried out by the use of instruments or tents.

In neuralgic dysmenorrhœa, dependent rather upon nervous disorder accompanying menstruation than upon menstruation itself, measures directed to the improvement of the nervous system and the nutrition of the patient are necessary. (See Cimicifuga.) These cases generally occur in nervous, anæmic women run down by excessive dancing or other gayety or by the bearing and care of a large family of children.

A course of strychnine or quinine and iron in small doses is often beneficial in these cases, and horseback exercise between the menstrual periods, out-of-door life, and avoidance of excessive dancing and exhausting exercise are to be ordered.

Sometimes bathing the loins with alternate dashes of hot and cold water may do good in atonic patients.

Cannabis indica and gelsemium are often of great service, both as cures and alleviators of the pain, and antipyrin, acetanilid, and similar drugs may be resorted to while the attack lasts, if it be neuralgic.

When the pain seems to be greater than the patient can bear, enough ether or bromide of ethyl should be given by the physician, by means of inhalation, to produce the primary stages of anæsthesia, but chloroform is not advisable, as the patient, if taught its value by the doctor, may resort to this dangerous drug without advice and die from an overdose.

DYSPEPSIA.

(See INDIGESTION.)

DYSPNŒA.

Shortness of breath, or dyspnœa, arises from cardiac weakness, abnormal innervation resulting in cardiac palpitation, from the accumulation of fluids in the chest, from the involvement of the lungs by any disease-process in such a way that respiration becomes impaired, or it is produced by indigestion, or, finally, by the encroachment on the lungs or chest-walls of tumors and growths.

Each of these states must be removed to effect a cure, but it is only of the relief of the symptoms that we will speak.

In old persons who suffer from dyspnœa the result of bronchorrhœa, where a large amount of liquid fills the bronchial tubes and shortness of breath follows exertion, strychnine is the best remedy that we have. Its value depends upon its powerful influence over the respiratory centres, on which it acts as a stimulant; and as these cases very commonly also have dilatation of the right side of the heart, with consequent cardiac enfeeblement, strychnine is of additional service through its influence upon the circulation. These persons are not to be given opium or its alkaloids or any sedative drugs, as such medicines, while giving temporary relief from cough, only serve to depress the respiratory apparatus and cause an accumulation of liquid mucus in the chest as a result of the prevention of cough and lack of expectoration. The cases in which opium or morphine do good are those in which, through nervousness or functional nervous disorder, the respiratory cycle is imperfect, and, above all, in those instances where dyspnœa occurs as the result of cardiac disease. In these cases the attacks of oppression and suffocation can often be entirely set aside by the use of ⅛ to ¼ grain (0.008–0.015) of morphine, given every night or at night and morning. If these doses fail, larger ones may be cautiously used. Hyoscine, instead of causing sleep, nearly always makes these cases worse.

Sometimes a little carbonate of ammonium is useful as a respiratory and cardiac stimulant in cases of dyspnœa.

Dry cupping applied over the back of the chest may also be serviceable when shortness of breath from cardiac or pulmonary trouble is present.

In cases of dyspnœa due to emphysema and pulmonary inflammation of a chronic type, or in those persons who take cold on the slightest exposure, particularly after attacks of asthma, arsenic is useful if continuously employed.

If pleural effusion be present, relief of a positive and lasting nature can only be obtained through aspiration, or, in other words, by the operation known as thoracentesis.

EARACHE.

Earache may arise from a great number of causes, all of whi
are, practically speaking, inflammatory. The pain may be the re
of acute or chronic inflammation of the middle ear, with a serou
purulent exudate, or to furunculosis of the external auditory ca
In other cases an eczema of this part is very painful. The treatm
of the acute earache is systemic and local, the former being based
the general rules governing the management of inflammatory proce
the latter by the area involved and the cause of the trouble. In
general treatment several leeches may be placed in front of or beh
the ear, and heat in a dry form is to be applied to the head on
side affected, by means of a hot bottle or water-bag. Poultices, oil
laudanum, and similar applications are *not* to be resorted to, as t

may ultimately cause trouble and do not always produce even temporary relief, but tincture of belladonna and tincture of opium in equal parts may be dropped in the ear in the dose of 5 to 10 drops when necessary.

A very efficient means of relieving the pain is to irrigate the ear with a normal salt solution, as hot as can be borne, every hour or two.

Cardiac sedatives are indicated, but quinine is distinctly contraindicated, as it tends to cause aural inflammation.

If a cold in the head is present, and with it acute myringitis, it is important to establish a free opening through the nostrils, particularly if the middle ear is also involved, in order to clear the orifice of the Eustachian tube. This is to be accomplished by dropping into each nostril 1 to 3 drops (0.05–0.15) of a 4 per cent. solution of cocaine, and, as soon as the engorged mucous membrane is anæsthetic and shrunken, to use an atomizer with a fine spray attachment and the following solution:

℞.—Acid. boric. . . . . gr. x (0.65).
Sodii chlorid. . . . . gr. xij (0.8).
Sodii borat. . . . . gr. x (0.65).
Aq. rosæ . . . . q. s. ad f℥iij (96.0).—M.
S.—Use as a spray.

This should be followed by a spray of menthol and albolene, 3 grains to the ounce (0.15 : 32.0), in order that the menthol may prolong the effect of the cocaine and prevent secondary congestion. This is now to be followed by inflation of the Eustachian tube with a Politzer's air-bag. Only in most obstinately painful cases of acute middle-ear catarrh is paracentesis of the drum to be attempted. Should true septic otitis media develop and drainage of the middle ear become impossible through blocking of the Eustachian tube, then the doctor must very gently irrigate the external auditory canal with as hot water as can be borne, and render it entirely aseptic by insufflations of boric-acid powder. These injections should be frequently practised, and if the pain persists and the tympanic membrane is bulging, paracentesis must be performed in the most bulging part of the lower quadrant. After the paracentesis needle is withdrawn the discharge should be allowed to flow freely. The canal is then to be well irrigated with hot carbolized water (1 to 50), and as the discharge is constant a piece of sterilized cotton inserted and removed as often as it becomes soiled.

In the case of eczema of the ear hot irrigation, followed by the application of powdered iodoform, is perhaps the best application for temporary treatment. In furunculosis of the ear hot irrigation and free incision, with an iodoform dressing, are also useful.

When foreign bodies cause the pain, they are best removed by repeated and gentle syringing with hot water. Forceps are dangerous instruments in the hands of a novice treating the ear.

In earache due to neuralgia a swab wet with chloroform may be applied to the skin in front of and behind the ear.

ECZEMA.

This is probably the most common form of skin disease which the physician is called upon to treat, with the exception of acne.

Dermatologists divide it into many forms and stages, but in this book a consideration of its forms is out of place, and only the treatment for its stages is proper.

In the first place, it may be stated that the treatment is a quadruple one—namely, dietetic, hygienic, external, and internal.

In regard to diet, the patient should be told to avoid salt foods, such as salt fish or pork and corned beef; greasy foods, such as bacon and fried dishes; pastry and cheese. Only moderate amounts of wine and beer can be taken, and foods difficult of digestion are to be stricken off the bill of fare.

In the way of hygienic measures, fresh air, the avoidance of sedentary habits, horseback exercise, or walking are to be recommended.

External treatment is the most important of the two measures in which drugs are employed, and its course is perhaps best described by taking a case of ordinary eczema as an example and treating it through its entire course.

In the early stages of an acute eczema, when the process is very active and the erythematous reddening of the beginning of the disease is merging into the formation of vesicles or pustules, with the formation of large scabs, no application is better than oxide-of-zinc ointment, thoroughly applied night and morning. If the eczema be situated upon the scalp, the hair must be invariably clipped short or shaved off in such a way as to prevent the gluing of the hair into a mat by reason of the discharge. The ointment may be smeared over the part or applied on a piece of lint in a thick layer. Nearly always the ointment should be used in conjunction with black wash (calomel 1 drachm [4.0], lime-water 1 pint [500.0]), which should be applied twice a day, just before the zinc ointment is resorted to, by means of a swab or a sop, and allowed to dry. In other cases the powdered oxide of zinc is dusted over the part if the discharge is very watery and profuse, or the following ointment, recommended by McCall Anderson, is very efficacious:

℞.—Bismuth. oxidi	℥j (32.0).
Acid. oleic. pur.	℥viij (256.0).
Ceræ albæ	℥iij (96.0).
Petrolati	℥ix (288.0).
Olei rosæ	♏v (0.3).—M.

Ft. in unguent.
S.—Apply to the part affected.

As the quantities of this prescription are large, they may be reduced one-half for use in limited eczema.

Where the proliferation of cells and the secretion are very profuse it may become necessary to remove the crusts before the local remedies can reach the skin, and for this purpose poultices may be used; or, if the disease be on the face, the parts should be anointed with olive oil, containing 1 or 2 drops of carbolic acid to the ounce (0.05–

0.1 : 32.0), to soften the crusts, which are readily removed in a half-hour by the use of a little castile soap and water. The soap is not to be used if the inflammatory action is very angry-looking. Whenever itching is an annoying factor, the parts should be protected by lint smeared with some simple ointment, which may be carbolized both for its antiseptic and local anæsthetic effect. English and American dermatologists use what is known as liquor carbonis detergens very largely in the acute stages of eczema as well as in other skin diseases. It should not be used pure, but diluted in such a way that for each 4 ounces (128.0) of water 2 drachms (8.0) of the pure liquor are present. Liquor carbonis detergens is made by taking 9 ounces (288.0) of tincture of soap-bark (quillaia-bark) and 4 ounces (128.0) of coal-tar, mixing and allowing them to digest for eight days, after which the mixture is filtered and used.

When the disease has passed from the acute, active inflammation of the first stage to the subacute form of the second stage of its existence, applications of a mildly stimulant character are necessary. Before this the physician has endeavored to soothe the parts; now they must be excited to normal activity. For this purpose resorcin in the proportion of 2 to 30 grains to the ounce (0.1–2.0 : 32.0) of lard, according to the severity and induration of the lesion in the skin, should be used. Stelwagon recommends the following:

℞.—Unguent. picis liq. . . . . ʒj (4.0).
Unguent. zinci oxidi . . . . ʒvij (28.0).—M.
S.—Apply to the parts.

Where the disease is chronic and very persistent, but sluggish or atonic in its course, still more powerful remedies are necessary, such as salicylic acid, tar, or tincture of green soap used with hot water until the skin beneath is bared, dressing this by means of zinc ointment or resorcin ointment, 2 to 10 grains to the ounce (0.1–0.65 : 32.0), spread on a cloth. The salicylic acid should be used in the proportion of 30 to 60 grains to the ounce (2.0–4.0 : 32.0) of lard, while the tar is used in the form of the pure official tar ointment.

In seborrhœic eczema, where the secretion is greasy and dry, and followed, if wrongly treated, by oozing and the pouring out of serum and the formation of cells which form crusts, the following prescription is of value:

℞.—Resorcin . . . . gr. x vel xx (0.65–1.3).
Pulv. amyli }
Unguent. zinci oxidi } . . . . āā ʒij (8.0).
Petrolati . . . . ℥ss (16.0).—M.
S.—To be applied after removing the scabs by the use of a lotion composed of 1 part of bay rum and 3 parts of water.

The internal treatment is directed to the cure of any disordered function which is present, such as dyspepsia (see Indigestion), hepatic torpor, general debility, anæmia, scrofulosis, inanition, constipation, gouty diathesis, or renal insufficiency. The gastric disorder is to be relieved by the use of hydrochloric acid and pepsin; the hepatic torpor by mercury, podophyllin, or, better still, by freshly-prepared undiluted nitro-hydrochloric acid added to water; the debility by tonics, such as cinchona, cod-liver oil, strychnine, and bitters; the anæmia by iron, and, if scrofulosis exists, by the syrup of the iodide of iron. Constipation is to be cured by the use of proper foods and laxatives, and the gouty tendency counteracted by the employment of lithium citrate and colchicum or potassium iodide. If the kidneys are at fault because of torpidity, the diuretic potassium salts, such as the citrate, are indicated. Arsenic is never to be used, except in those instances where the skin is very dry, and where, by improving digestion and through its alterative power, it does good. In the chronic forms of dry eczema or those depending upon some atonic state of the trophic nerves of the skin, arsenic is of great value in the form of Fowler's solution, or arsenous acid may be given.

EMISSIONS.

Seminal emissions occur as the result of sexual abuse, whereby a condition of hyperexcitation of the nervous cells in the spinal cord and the nerves of the genitalia is developed, or they are due to peripheral or centric irritations, which reflexly irritate the genitalia or the nerves, and to a number of other similar causes. These emissions also occur with some periodicity in normal males who are continent and chaste, and under these circumstances are not to be interfered with by treatment, unless the emissions become excessive.

The former types are, however, proper for medical treatment, and their cure consists in the avoidance of unchaste literature and lascivious thoughts during the waking hours, and the use of such spinal and cerebral sedatives that the centres governing the ejaculations of semen may be calmed, and so quiet a sleep produced that erotic dreams are avoided. The patient should sleep on a hard hair mattress, not be too heavily covered, and should avoid sleeping on his back, as this causes an undue blood-supply to the spinal centres, and consequent stimulation and ejaculations. Sometimes hard bodies, such as spools, are tied around the loins, so that lying on the back will cause so much discomfort that the patient awakes and turns on his side. The drugs to be used are bromide of potassium or sodium in 20-grain (1.3) doses at bedtime, or chloral may be taken in the same amount. Hyoscine is certainly of value in the dose of $\frac{1}{100}$ grain (0.0006). Sometimes a warm sitz-bath or general bath before going to bed is of service. In other cases, where atony is the cause of the trouble, the physician should recommend cold sponging of the perineum and loins night and morning.

In the cases in which emissions come on as the result of continence, and become excessive, the remedies just named are to be tried, but really do not effect any permanent cure unless used until sexual power is seriously depressed, so that it has been the custom of many physicians to recommend "marriage," which the patient may interpret in its legitimate light or not as he pleases.

It is worthy of note that all irritations of the urinary bladder and other parts of the genito-urinary system should be removed, and it is often of value to administer citrate of potassium in 20-grain (1.3) doses, in water, three times a day, to render the urine non-irritating and alkaline. Stimulating foods and drinks are to be interdicted, and condiments, such as pepper and mustard, avoided.

Sometimes, when the emissions are caused by *genital atony*, strychnine and arsenic are of very great service if given in full dose.

In many of these cases it is the duty of the physician to treat the moral state of his patient as well as to give medicines. Many persons, believing that emissions are always an evidence of disease, read books on such subjects which are sold by quacks and soon find their way to the hands of these persons, or sensibly consult a regular physician. Half the treatment in these instances consists in assuring the patient that he has nothing to worry about, and in making him feel that the physician is his friend and worthy of all confidence and complete belief.

ENDOCARDITIS.

Endocarditis occurs sometimes as a single manifestation of disease; sometimes as a symptom, with many others, of some general tendency produced by a diathesis, such as gout and rheumatism or syphilis. Further than this, it may be acute, subacute, or chronic, and each one of its forms must be differently treated.

It is hardly necessary to state that any diathetic taint should be treated by antirheumatic or antilithic remedies, such as the iodides. The iodides are not, however, indicated if any rapid changes of a degenerative type are at work.

In acute sthenic endocarditis, associated with great vascular disturbance and much cardiac embarrassment or irregularity, there is no remedy so useful in the early stages as full doses of tincture of aconite, 2 to 3 drops (0.1–0.15), given every hour until the physiological symptoms of its influence are felt, or, in its place, with equal efficacy may be employed the tincture of veratrum viride (2 to 3 drops [0.1–0.15]). At the same time calomel and opium may be used, the calomel for its antiphlogistic influence, and the opium to control the purgative tendencies of the mercurial. Thus we may use $\frac{1}{4}$ grain (0.015) of calomel every two hours and $\frac{1}{10}$ grain (0.006) of morphine. Leeches should be placed over the præcordium in a goodly number, and if these are not obtainable wet cups are to be employed. In most cases it is better to apply an ice-bag over the heart. This depletion is only of service when the disease is seen early enough to allow us to limit the inflammatory process. As the disease progresses, if the physician fails to stop it, it will be found that the heart becomes somewhat labored in its action, irregular, and weak, and that its rhythm is seriously interfered with. At this time digitalis is of use in stimulating the depressed cardiac muscle and increasing its reflex activity, also steadying it through the pneumogastric irritation which it produces. Aconite and other depressants are contraindicated at this time. Absolute rest upon the back is to be insisted upon, and it is recommended, in those cases where deposits of a calcareous nature are likely to occur in the valve, that the citrate or acetate of potassium be given or that citrate of lithium be employed. If the disease becomes ulcerative, supporting treatment, consisting chiefly in the use of good food and the tincture of the chloride of iron is of great value if the dose which is given is large.

EPILEPSY.

The disease known as epilepsy is probably the most disheartening condition as to treatment that the physician has to deal with, since it often resists the influences of all the standard remedies. and drives the practitioner from drug to drug in the hope of finding one which will be at least alleviating in its effects. For this reason the author has in this article included many of the drugs which are rarely used, as well as those generally recognized as useful in its treatment, in order that the physician may try every remedy of any possible value.

It should be borne in mind that the treatment of epilepsy is as various as the disease is variable in its forms and phases, and should, in nearly all cases, resolve itself into two or perhaps three divisions, consisting in the removal of any exciting cause, in the checking of the convulsive tendency already set up, and in the prevention of any further attacks by suitable drugs or other measures of relief.

The treatment is governed largely by the cause, and is medicinal or operative according to the etiological factors at work. In simple idiopathic epilepsy medicinal means must be followed, while in a case resulting from traumatism the depressed bone, abscess, or tumor must be removed, and in those due to reflex irritation the peripheral source of trouble must be sought out and relieved.

So far as drugs are concerned, the most valuable remedy in use for the relief of epilepsy is bromide of potassium, although other forms of bromide salts are to be mentioned later on.

This drug, however, is not a "cure-all," even in epilepsy, and reports are constantly made of cases where it has failed; but many cases prove that the remedy is undoubtedly responsible for a cure when it is pushed in a suitable manner, and in the vast majority of instances the seizures are so decreased, both in violence and frequency, that its use may be said to be indicated in every case of the disease.

In a very small minority, however, it signally fails, and in a still smaller number of cases it is useless unless combined with some other drug whose power alone is very slight. Nevertheless, it is to be laid down as a rule that the bromide treatment of epilepsy is. *par excellence*, the treatment to be employed on every occasion. There is no other drug known which can be relied upon so absolutely, or which is so powerful in its action and devoid of marked toxic effect unless given in enormous doses.

The doses to be used vary with the salt employed to a considerable extent, and depend upon the character of the disease and the temperament and physique of the patient. The greater the duration of the disease, the greater is the difficulty in effecting a cure, and the length of time which the man has been epileptic should therefore be most carefully reckoned before the treatment begins. Further than this, the frequency and severity of the attacks are to be looked into, and these points are really more important than the actual duration of the ailment; since if a man has only one fit every six months for twenty years his condition is far less serious than if he has a history of three or four fits a day for one year. Again, the character of the attack, as to its violence, may be the most important fact to be regarded, for if it is violent enough to endanger life, remedies must be pushed even beyond the point of tolerance. The writer has heard a very celebrated physician cause much amusement among his auditors by detailing an instance of an epileptic who was getting well, and would have *recovered if he had not died*. His explanation was, that the man was syphilitic, and was receiving moderate doses of iodide and bromide of potassium, which were slowly benefiting him, and would have cured him had not a single severe fit produced death in the mean while. Another point to be considered is the condition of the digestion, which the bromide of potassium is peculiarly liable to disorder, and which is sometimes so disturbed as to necessitate the administration of the drug by the rectum in serious cases. Females generally require smaller doses than males, and children of both sexes do not require as large quantities as adults. The dose to be used in the beginning of the treatment in moderate cases is about 10 grains (0.65) thrice a day; and while this may seem a very small quantity, it will be found that it can be rapidly increased in amount without causing the gastric distress produced by the sudden use of larger doses. Each day an additional 10 grains may be added, until at the end of a week the patient is taking 80 grains (5.3) in each twenty-four hours. There are very few cases which will not become completely saturated with the drug if this is done, and there are very few in which a more rapid arrival at bromism is needed. If, however, the patient has become able to stand large amounts by the prolonged use of the drug, the amount given is not to be governed by grains, but by physiological effects, and it may be pushed to any amount which is borne without distress.

In chronic epilepsy, too, with regularly recurring fits, the greatest good is obtained by pushing the drug in ascending doses for one week, and then for the succeeding week only enough is given to preserve the general effects of the medicament. By doing this the stomach gets a rest and the appetite is not greatly interfered with. Where the attacks occur only every two weeks, this is a particularly useful method for obvious reasons. As regards the time of day when the drug is to be taken, there can be no doubt. Some writers have directed that it shall always be taken before meals, but this is entirely lacking in advantage and decidedly fruitful of harm. Medicines which are given with the object of affecting the general system should be taken after meals, not before, and it is only when a local gastric effect is desired that we use them on an empty stomach, particularly when the substance is as irritant and depressing as potassium. If taken after meals the appetite is not decreased, but there are few who can take a dose of 10 or 20 grains (0.65–1.3) of bromide of potassium before breakfast without suffering from indigestion. It has been held by some that the drug should be taken in minute doses, frequently repeated, in order to keep the patient constantly under its influence. This is an example of therapeutic ignorance, because bromides are slowly eliminated, and this frequent administration possesses the disadvantages of being inconvenient, annoying, and apt to disorder the stomach. In this connection it is not to be forgotten that the use of full doses of the bromides, particularly in epileptics of an advanced type, sometimes causes maniacal outbursts in place of the epileptic attacks. In other instances the patients become morose and homicidal. (See article by author in *Therapeutic Gazette*, June, 1897.) Cases are on record in which the persistent use of large doses of the bromides has resulted in bronchitis with profuse and dangerous exudation, causing suffocative bronchitis.

If the attacks have a distinct periodicity or can be foretold for as much as two hours beforehand, the remedy may be taken in a large dose only at this time, and but a few grains given in the intervals; and if the attacks are severe, no one should hesitate to use large doses by the mouth and by the rectum on the day of the attack.

A very important point to be borne in mind is that the drug often seems to have produced a complete cure, and this results in carelessness in the regularity of administration. The patient should be impressed by the fact that every day passed without a fit is a step forward, and that every fit carries him many steps backward. He should also be made to use the drug, in moderation, for at least three years after all fits have ceased, and to watch after that time for the slightest sign of their return. The quantity taken each day should be gradually decreased, not suddenly stopped short.

It is true also that if a recurrence of the fits takes place they yield to treatment very much more slowly than before.

Before passing on to the discussion of the other bromides, and the conditions produced by the excessive use of all of them, we may place our use of these compounds in epilepsy on a scientific footing. It is now generally recognized that the seizures known as epilepsy arise from the cells in the cerebral cortex, and there can be no doubt that the bromides act very powerfully upon the cerebrum in the higher animals, decreasing the irritability of the motor centres in these regions to a very great extent. Not only is this pointed to by clinical facts, but the well-known researches of Albertoni prove that such is their action beyond all doubt. This investigator found that the administration of a single dose of the bromide of potassium so lessened the excitability of the motor cells in the cortex cerebri that much stronger stimulation was necessary in order to cause response in the limbs than was normal, and that it was difficult to produce epileptic attacks by means of the electrical stimulation of the motor areas, even when currents very much stronger than those which commonly produce such a result were used. He also found that this lessened irritability was increased still further if the drug was *given for several days beforehand* in such doses as *thoroughly to impress the organism.* It is therefore evident that the bromides act directly on the cortical areas, calming the tendency to explosions of nerve-force.

There is one more point to which attention must be called, and that is the fact that when the bromides are taken for any length of time they produce bromism, which in its moderate or severe forms produces a mental condition very closely allied to that seen in old, chronic epileptics. This condition of the mind should never be overlooked, and the ordinary mental changes of epilepsy are greatly increased by its constant and careless administration. (See Bromide of Potassium.)

The bromide salts of gold, iron, sodium, lithium, nickel, and ammonium have all been used in epilepsy with good results, but, except in certain instances, they fail to act as well as that of potassium, unless given in larger doses. There are several circumstances, however, under which each one possesses marked advantages, and may suceed where potassium has failed. In all cases of epilepsy complicated with anæmia the bromide of iron should be employed, but where there is plethora it will generally increase the disease or do no good. When it acts after potassium fails the iron is of value, because of its tonic and nutritive effect. Bromide of sodium, while somewhat less powerful than potassium, is not by any means so apt to disorder the stomach, and is preferable in some cases on this account. It possesses no other advantages.

The bromide of lithium has been highly recommended in intractable cases by Weir Mitchell, who even states that it may be given in one-half the dose of the potassium salt with equally good effects.

The bromide of nickel cures some cases where all other remedies fail, but this occurrence is rare. In a series of physiological experiments made by the writer some years since he found it virtually identical with the potassium salt in its action, and it is useful in about the same doses and cases as is bromide of potassium.

The bromide of ammonium is very irritant and disorders the stomach quite readily. It ought always to be used, when used at all, with some other drugs, the ammonium salt only acting as an adjuvant.

Several clinicians have tried hydrobromic acid, but it is very much more apt to derange digestion and to produce vomiting than any of the salts. The dose of the dilute acid is ½ to 3 drachms (2.0–12.0) in a tumblerful of sweetened water.

The bromate of potassium has been used by Mitchell in doses of not more than 5 to 10 grains (0.3–0.65) with good results, but is more dangerous and scarcely of greater value.

There can be no doubt that in some instances what is known as the mixed treatment is successful when all else fails. This consists most commonly of a prescription in which the bromides of potassium, sodium, and ammonium take part. Why this combination acts better than any one of the salts alone no one knows, but it is certainly a clinical fact.

Bechterew has recommended the joint use of the bromides with adonis vernalis in epilepsy as follows:

℞.—Potassii bromidi . . . . ʒiij (12.0).
Infus. adonis vernal . . . . f℥vj (180.0).
Aquæ destillat. . . . . . q. s. f℥vj (180.0).—M.
S.—A dessertspoonful three times a day.

Sometimes codeine is combined with this prescription.

Within the last few years it has been claimed by Flechsig that the use of opium for a long period of time is useful in the treatment of epilepsy. He gives the opium in ascending doses during a period of six weeks, beginning with ¼ grain (0.018) three times a day and going as high as 5 grains (0.33) three times a day. This method decreases the frequency and severity of the fits for several months in some cases, but does not cause a cure. It succeeds best in old cases and is not useful in recent ones.

In still other cases digitalis, when used along with one of the bromides, seems to produce favorable results. Indeed, digitalis has for years been used alone in epilepsy with fairly good results, and should always be used in obstinate cases. In *petit mal*, where bromide of potassium when used alone so often fails, it is useful, and several English writers, notably Gowers, assert that its best effects are in cases of nocturnal epilepsy. Why this should be the case no one knows, and it would seem doubtful whether it does any more good in nocturnal attacks than in others.

Another combination very much employed and lauded is bromide of potassium with belladonna, the mydriatic being almost useless alone, but of great antiquity in its use in epilepsy. Like the mixture of digitalis and bromide, it succeeds very frequently in *petit mal*, and, indeed, seems to be much more successful than the digitalis, but its mode of action is exceedingly doubtful. As the drug acts even more powerfully upon the nervous system than upon the circulatory apparatus, it has been thought that its influence for good depended upon this effect, but the experiments of Seppilli contradict this belief, for he found that if atropine was given to an animal the surface of the cortex cerebri responded more readily than is normal to electrical stimulation.

At one time it was held that belladonna acted on the spinal cord and peripheral nerves under such circumstances, but it should be remembered that we now know that atropine is only of value in relaxing spasm when given in full dose, oftentimes hypodermically, and that Albertoni has made a series of experiments to determine whether it irritates the motor centres of the cortex. In his hands repeated small doses or one large dose in no way retarded the convulsions commonly produced by stimulation of the brain. Both these investigators are therefore in accord. Under these circumstances it affects rather the motor nerve-endings than the central nervous apparatus.

As long ago as the early part of this century *cannabis indica* came into notice in the treatment of epilepsy, and it is probably of greater value alone than when combined with any other drug, unless it be with the bromides. Although it is at present rarely so used, the author believes, from his own studies, that it is of value, for he found that it distinctly lessens reflex action and acts powerfully upon the higher nervous centres in the brain. Its use and value in migraine are undeniably of the greatest importance, and epilepsy and migraine are often very closely allied.

Nitrate of silver was brought into use long before the value of more recent drugs was known. Every one is agreed that it is without power for good, save when it is used constantly for a long time. As the drug is eliminated very slowly, it rapidly accumulates in the body, and argyria soon comes on. It may be used, after all else fails, in doses of $\frac{1}{6}$ to $\frac{1}{4}$ grain (0.01–0.15) thrice a day after meals, the mucous membrane of the inside of the lips and the conjunctiva being carefully watched for the early signs of chronic silver poisoning. We certainly have no knowledge as to its influence on the nervous system; and if it acts at all, it must be by some alterative influences rather than by any other means.

Nitroglycerin is to be employed in the treatment of *petit mal*, rather than *haut mal*, in the dose of 1 drop (0.05) of a 1 per cent. solution, once, twice, or three times a day. Our knowledge of its effects, so far as its curative influences are concerned, is very slight, but it seems to benefit some cases. Its action is very fleeting, and it influences the brain very little, except it be taken just before an attack is expected or when the cardiac action is defective. Its great lethal power should never be forgotton.

The use of the nitrite of amyl is not for the purpose of directly curing the disease, but of warding off impending attacks, the warning of which is given by an aura of slow progression. It increases the severity of *petit mal*, but in epileptics who have a prolonged aura we may use nitrite-of-amyl pearls, which consist in small glass beads containing a few drops of the drug. As the aura comes on the patient should break one of these in his handkerchief and inhale the drug, thereby putting aside the attack. The influence which the drug exerts upon the brain is secondary rather than primary, and is probably dependent on its action on the blood or circulation. Its influence on the spinal cord and nerves is much more marked and direct, and it is most certainly a very powerful spinal depressant. As its influence over unstriated muscular fibre is very great, it affects the vasomotor system very powerfully; and those who think epilepsy is due to a vasomotor spasm at the base of the brain point to the effects of this drug as a proof of their hypothesis. Such reasoning is not, however, necessarily correct. Nitrite of amyl puts aside an attack by a sudden shock to the nerve-centres, which diverts them, so to speak, from their intended discharge, very much as a ligature around the arm stops an aura. When we remember that the drug acts instantly and converts nearly all the oxygenating blood of the body into a non-oxygen-carrying fluid by reason of the methæmoglobin produced, the sudden change in the cerebral nutrition and state is easily understood.

In the treatment of the "status epilepticus" nitrite of amyl is of great value in stopping the seizures, and may be used under these circumstances in heroic amounts, applied to the nostrils at intervals. During the presence of the tonic spasm, if it be severe enough to stop respiration, it should be remembered that if the drug is not inhaled it is absolutely worthless. It is only when respiration is being carried on that it can enter the lungs and do its work. Another valued method in treating the status epilepticus is free bloodletting. The nitrite of ammonium or of sodium should be used internally to supplement the nitrite of amyl.

The use of anæsthetics during an attack of epilepsy is virtually useless, and in some cases dangerous, for ether is too slow in its effects, and may, by its irritant vapors, increase the tendency to laryngeal spasm or cause lung complications. Further than this, if uræmia is the cause of the fit—and this fact is unknown in every case until the individual is carefully examined—the ether may increase the inflammation of the kidneys very seriously.

Chloroform, though it acts much more rapidly, may cause sudden cardiac failure, and both drugs may increase the post-convulsive coma very greatly. In "status epilepticus" they may be used, as in such cases the convulsions must be stopped at all hazards, but the preference should be always for amyl nitrite.

The iodide of potassium is entirely useless in epilepsy unless the disease is due to syphilis, when it is of the greatest service. Indeed, the bromide and all other drugs should be set aside while this one is pushed to the utmost. As is well known, syphilitics usually bear the drug extremely well, and the author knows of one instance where no less than 800 grains (53.0) were taken every twenty-four hours, with rapid improvement as a result. This point is strongly insisted upon by all therapeutists and syphilographers, notably among whom stands Fournier.

Where the convulsions are due to the presence of a gumma, the iodide of potassium is, however, too slow in its action, and should be associated with mercury in order to break down the growth without delay, lest a seizure cause death by glottic closure, producing asphyxia or some similar accident.

Chloral hydrate is a remedy which has been only partly tried in epilepsy, and its usefulness is not as yet determined. It possesses the marked disadvantage, as compared with the bromides, of being a very fatal poison, which is an important fact to be borne in mind by the physician when giving it to a patient whose mind is already weakened by the disease or naturally stupid, and who may forget and take too much. Its physiological action indicates much more fully that it may be of value than does that of many other much more lauded remedies, since it exerts its chief influence on the motor pathways of the spinal cord and quiets the motor portion of the cerebral cortex, and also produces sleep. Seppilli has proved this by direct experimentation after the method employed by Albertoni. Its use, combined with one of the bromides, is often accompanied by the most desirable results, and it should be tried at all times unless some cardiac complication forbids it. It may disorder the stomach, and should, like the bromides, always be given well diluted and after meals.

Of the more recent remedies, acetanilid certainly stands in the foremost rank, and bids fair in some instances to rival the bromides. Professor Germain-Sée, the author, and some others have reported cases which obtained very marked relief from it, and more recent investigators have done likewise. The drug will be found to exert its chief benefits in chronic epilepsy. At least, if a child was brought to the author with a beginning epilepsy he would use the bromides, but, if the disease was chronic, acetanilid.

Antipyrin has been recommended by Lemoine in certain forms of epilepsy, but is condemned in many cases. In those who *suffer from menstrual epilepsy*, so called, or in those in whom the attack is produced reflexly by the presence of intestinal parasites, the drug does good.

Lemoine also found it very useful in those cases which are associated with migraine. In these cases the results were better than with the bromides, but in the idiopathic simple varieties it was useless. Mairet and Combemale have used the drug in the epileptiform mania with satisfactory results.

In the epilepsy of childhood Solanum Carolinense in the form of the fluid extract, in the dose of 2 to 15 minims (0.1–1 cc.), is a useful drug.

The value of the treatment of epilepsy by borax has not received very wide recognition. Perhaps the most thorough studies of its effects have been those of Gowers in England and Folsom in America. It would seem that some cases which are obstinate under ordinary treatment are benefited by borax, but it is certainly not to be commonly employed. The dose generally given is about 15 grains (1.0). (See Borax.)

In children suffering from frequently recurring epileptic attacks the presence of worms should always be looked for, and when they are found they should be expelled as rapidly as possible. If they are the *oxyuris vermicularis* (seat-worms), the best remedy by far is the injection of a strong infusion of quassia of such a strength that there are 2 ounces (64.0) of quassia to each pint (500 cc.) of water.

In girls, where the removal of the worms from the rectum is not followed by relief, a careful examination of the vagina should be made, and quassia employed in somewhat weaker solution, as very commonly intense inflammation is there present, produced by migratory movements of rectal parasites. If the quassia is unobtainable in any case, a saturated solution of chloride of sodium may be employed.

A very important point, which is constantly brought before the physician who is treating epilepsy, is that of diet. Nearly every patient who suffers from this disease inquires what he shall eat. Very few researches of a thorough character have ever been carried out on a large scale to determine the things which may or may not be ingested. Of course, nearly every one of us knows from our personal experience that red meats are hurtful, particularly in children. Curiously enough, the influence of diet in one research covering a number of cases of chronic epilepsy seemed to be of little moment. Thus, Merson examined 24 such cases, putting 12 of them on a purely vegetable, and 12 on a purely nitrogenous, diet. The result, after this study had been continued for two months, was that the vegetarians had had a few less fits than the others, but the difference was so slight as to be of almost no weight in determining the question. Some authors at the present day believe this opinion as to the harmfulness of meats to be erroneous, and Gowers is one of them.

EPISTAXIS.

Nose-bleed depends upon many causes, the chief of which are traumatisms, plethora, and the presence of ulcerations in the nasal chambers. It also occurs as one of the prodromata of typhoid fever.

Probably plethora is the most frequent cause of nose-bleed, and in most instances it is an attempt on the part of the system to rid itself of an excess of blood. Under these circumstances epistaxis is not dangerous, nor is it proper to arrest it unless it becomes excessive. When it is excessive or must be controlled for any reason, the measures to be adopted are both medicinal and non-medicinal. If the person is full-blooded and strong, full doses of tincture of aconite or veratrum viride are useful, say 2 to 4 drops (0.1–0.2) of one of them, followed in a half-hour by a smaller dose, if necessary. The value of these drugs depends upon their power of lowering blood-pressure, and in consequence decreasing the leakage from the break in the wall of the blood-vessel. Some physicians have recommended ipecac in full nauseating doses to relax the arterial system. Powdered alum, pure or half and half with starch, or alum in solution, may be snuffed up the nostril, and tannic acid, in powder or in solution, may be used with advantage. If this does not control the hemorrhage, an atomized spray of Monsel's solution, in the strength of 30 drops to 4 ounces (2.0 : 128.0) of water, may be of service. Ergot in the form of the fluid extract in the dose of 1 drachm (4.0) may be given, or its wine in the dose of a wineglassful (32.0) employed. Sometimes, when the oozing is slow, doses of turpentine taken internally, oil of erigeron, or hamamelis, do good.

All these remedies act as styptics when locally applied, by causing coagulation of the fibrin and the formation of a clot, while the internal remedies produce local contraction of the blood-vessels in the congested area.

The non-medicinal measures to be employed if the bleeding is severe consist in plugging the anterior nares with pledgets of cotton or pieces of lint soaked in vinegar. If this does not control the hemorrhage, the posterior nares may also be closed by plugs, and compression of the facial artery of the same side as the bleeding nostril be made upon the superior maxilla near the nose, thus decreasing the blood-supply. The head must be kept raised, and the patient must not bend over a basin or wear a tight collar.

A piece of bacon fat cut to fit and placed in the nostril may stop epistaxis which has resisted all other measures.

As a household remedy vinegar may be injected into the nostrils, or lemon-juice may be employed in the same way.

Sometimes, if the patient raises one or both hands high above the head, the hemorrhage ceases. This is due to the fact that the easiest pathway for most of the blood is straight up the brachial arteries rather than through the tortuous vessels of the face. A hot foot-bath, by dilating the veins of the lower extremities, draws away the blood from the face and is a useful measure. In other cases a hot-water bag applied over the dorsal vertebræ is efficacious, and sometimes cold when so used is of service. A piece of ice pressed against the nose may prevent further hemorrhage by causing localized anæmia.

Where the nasal hemorrhage results from traumatism with fracture of the bones, and great loss of blood ensues, ligation of the bleeding vessel or its supplying vessel should be performed if possible.

ERYSIPELAS.

This disease is now generally recognized as dependent for its existence upon a germ. The streptococcus of erysipelas is practically identical with that of pus, and the disease is at first a distinctly local one. The changes which have come forward in its treatment are chiefly the local measures, while those methods which have been used internally for many years have suffered no alteration.

Whether or not erysipelas is a local or systemic disease has little to do with the proper treatment. In any case it is an inflammation, and as such it must be treated. In its early manifestations and where some uncertainty may exist as to its true character aconite or veratrum viride may be used in sthenic cases in which the nervous and circulatory systems give evidence of reflex irritation and the pulse is hard and full. These remedies are contraindicated if any tendency to weakness exists. DaCosta has recommended, and others have carried out with success, the practice of using pilocarpine in sweating dose ($\frac{1}{8}$ to $\frac{1}{6}$ grain hypodermically) in these early stages. (See Pilocarpus.) As with aconite and veratrum viride, it is to be remembered that this use of pilocarpine is not to be resorted to if debility exists.

The internal treatment of erysipelas *par excellence* is the plentiful use of the tincture of the chloride of iron—20 to 30 drops (1.3–2.0), or even 40 drops (2.65), four times a day. The diet should be regulated and the bowels kept in good order, while any excessive febrile movement is to be treated by the use of antipyretic drugs, such as antipyrin, or, better still, by cold bathing. Where the patient passes into the typhoid state supportive measures must be used and alcoholic stimulants added to the food, which should be predigested or prepared so as to be readily absorbed.

During convalescence the use of tonics, both in the form of iron and of bitters, is particularly indicated if the recovery of strength is slow. The local treatment of erysipelas is very varied, but in the majority of cases resort may be had to but one method.

By far the best dressing for the general run of cases of erysipelas is a modification of that of Von Nussbaum, which the author has tried in a great number of cases with success. The skin of the part involved is carefully cleansed with Castile soap of the purest form, and then it is washed off by a 1 : 1000 solution of bichloride of mercury. The skin is dried with a soft towel, and a thick coating of ichthyol with vaseline or lanolin applied, the strength of this ointment being half and half. Over this is placed antiseptic gauze or sterilized absorbent cotton, and adhesive strips or a bandage is used to keep the dressing in place. Sometimes the ointment alone may be applied if the area is small. Under this treatment the results are often extraordinary in all stages of the malady. Where ichthyol is not obtainable, a thick coat of white-lead paint, as it is sold in cans before it is mixed with any thinning substance, will be found of service in an emergency.

The plan recommended by Higginbottom, of applying nitrate of silver, is sometimes successful. It consists in the use of a solution of the strength of 80 grains to 4 drachms (5.3 : 16.0) of distilled water, which is thoroughly applied with a camel's-hair brush over the entire inflamed area and for a little space beyond. The application must be made twice or thrice to secure a good coating. This treatment will often arrest the inflammation and prevent its spread, but has caused sloughing.

EXHAUSTION AND DEPRESSION.

While the treatment of both these conditions is almost identical in some respects, it is, nevertheless, important that a clear idea of the difference between the two be clearly understood, if for no other reason than that the physician may recognize that exhaustion is a far more serious state than depression. It also requires more careful treatment. The man who is depressed retains in his body all the vital forces necessary for the maintenance of life, but they are temporarily in abeyance from some cause. As soon as the incubus is taken away the system at once asserts itself and recovery takes place. This is not the case with a man suffering from exhaustion. In this patient every particle of his strength is sapped and lost. The man depressed is the giant lying unconscious from a blow on the head; the man exhausted is the same giant after a long attack of typhoid or other fever of a similar nature. The treatment of depression is stimulation; of exhaustion, not only stimulation, but feeding and protection from exposure.

FEET SWOLLEN, TENDER, OR SWEATING.

These comparatively simple yet annoying conditions are often brought before the physician for relief, and patients suffering from them will frequently be more grateful for skilful treatment than in the event of recovery from a severe illness.

Swelling of the feet occurs chiefly in two classes of cases, excepting, of course, in dropsy, which makes a third class. The two classes named are old persons taking too little or too much exercise, and who may have gouty or rheumatic tendencies, and those who by constant standing or walking cause congestion of the lower extremities, chiefly by fatigue, or by wearing bad shoes, or by running over uneven ground, causing bruising. Where the swelling takes place in the first class, small doses of arsenic, in the dose of $\frac{1}{60}$ to $\frac{1}{40}$ grain (0.001–0.0015), often do good, and careful examination should be made of the circulatory, renal, and respiratory apparatus to discover any weak points, such as vascular relaxation or tendencies to varicosities. The distilled or fluid extract of hamamelis is often of service in the dose of $\frac{1}{2}$ to 1 drachm (2.0–4.0) of the former and 10 to 20 drops (0.65–1.3) of the latter preparation. In some cases absolute rest of the feet will be necessary before a cure is reached.

Where the feet are tender the most common cause is bruising from too thin soles on the shoes, too tight shoes, and from abrasions or skin disease. More commonly than all they become sore from excessive sweating and resulting maceration.

The treatment of sweating and tender feet is, of course, the removal of the cause and the use of remedies designed to toughen and harden the skin of the parts. Probably the best application for this purpose is a solution of salicylic acid and borax, half and half, in water and glycerin, rubbed over the feet night and morning. If the sweating is very severe, clean stockings should be worn each day, the stockings being previously soaked in a strong solution of borax and dried. The following prescription affords a useful powder:

℞.—Pulv. acidi salicylici . . . . . . gr. xx vel xl (1.3-2.65).
Pulv. acidi borici . . . . ʒij (8.0).
Pulv. amyli . . . . q. s. ad ℥j (32.0).—M.
S.—To be dusted over the feet night and morning, after washing and thoroughly drying them.

Sometimes the use of cotton instead of woollen stockings may aid in the cure.

FEVER, AND ITS TREATMENT.

(*For the Treatment of each Fever, see its Title.*)

At the present time the medical profession are almost universally of the opinion that fever is a disorder of calorification dependent upon nervous action, said nervous action being the result of various causes, such as the presence of poisonous materials in the blood or of perverted functional activity of heat-centres. The first may be represented by the fever of any infectious disease; the second, by the so-called hysterical hyperpyrexia. Turning from the general question of fever to those methods and drugs which combat it the rule of practice should be to control all fevers by the use of cold sponging or bathing and resort to antipyretic drugs as little as possible.

The value of a drug which can decrease high temperature by influencing heat-production alone cannot be over-estimated, and while several drugs seem to influence this part of the heat apparatus more than that portion connected with the dissipation of heat, we have no substance which is distinctly and solely capable of exercising an inhibitory power over the development of heat in the body. For practical purposes we may therefore divide antipyretics into three great classes: First, the substances which allay or prevent fever by inhibiting its production; second, the drugs which possess the power of decreasing bodily temperature by increasing the dissipation and decreasing the production of heat; and third, the compounds which allay fever, not by stopping the manufacture of heat-units, but by so increasing the exhalation of heat that the loss is greater than the manufacture. The first and last of these three classes are directly opposed to one another. The second class is half-way between, and it is to this class that most of our antipyretic drugs belong. The first is the ideal; the second is the one we have to be content with; the third is the one used by our forefathers.

The objection to the use of all antipyretic drugs is that they depress the patient and decrease his power of resisting disease.

Before we consider the uses of these drugs in fevers it is necessary to define what we mean by hyperpyrexia. As given by most writers upon the subject of fever, this term is applied to any state in which the temperature reaches 106° or 107° F., but the presence of a high temperature alone does not constitute the sole indication for treatment, the physician being governed by the state of the patient who is laboring under the malady. A temperature of 106° F. in a young healthy man suffering from an attack of some disease of short duration does not mean very great danger, but a temperature of 103° day in and day out in typhoid fever does mean danger, and must be carefully attended to. The question is one not of actual degrees Fahrenheit, but rather as to whether the temperature present is doing any harm.

Turning to the drugs which are divided into classes named from their physiological effects, we may, in view of our present knowledge, place them as follows: First, those which decrease heat-production alone are not known. Second, those which act both on dissipation and production are antipyrin, acetanilid, carbolic acid, salicylic acid, similar substances, and quinine. In this class, also, should be placed cold bathing, which probably decreases heat-production as well as increases heat-dissipation. Third, those drugs which only dissipate heat, as far as we know—namely, the great group of cardiac sedatives and their allies.

No one is more sensible of the fact than the writer that this arrangement of the subject is partly artificial, but in the present state of our knowledge it is probably the best we can do.

Though a number of writers have claimed that certain antipyretic remedies of equal power act with different results in different diseases, the writer has never been able to see any such distinction, and we must be guided rather by experience as to the value of some particular antipyretic in all diseases than by any other rule. All observers are not in accord, however, as to the best one of this class. While phenacetin has been spoken of very highly by some authorities, the writer has heard it equally condemned by others, and, although Ringer prefers antipyrin, Mitchell Bruce relies chiefly on acetanilid. In America many persons prefer acetanilid.

It may be said that we have only three measures for the relief of fever which are reliable and have stood the test of time. These are the employment of antipyrin and acetanilid, and the use of cold. (For the mode of using antipyrin and acetanilid see pp. 45 and 75, and for the use of cold see p. 391.)

A very important question arises as to the value of cold bathing in private practice. There can be no doubt of its acting well under these circumstances if carefully carried out, and it is certainly much the best remedy for fever where trained nurses are on hand to administer it, but where only members of the family are in care of the sick man, and where the doctor can only be on hand once in twenty-four hours, it is manifestly impossible to resort to it. Even if the bath be properly given, the exhaustion produced by clumsy handling may more than counterbalance all the good achieved. It has been claimed that the cold pack never results in cardiac failure, as does the use of antipyretics. We are quite confident of the fallacy of this statement. Indeed, the writer has recently seen such a case. The cold pack cannot be used more carelessly than antipyretic drugs, and it is probable that when this measure is more widely employed more reports will appear in the medical magazines of accidents occurring as the result of its abuse. (See Cold in Fevers, Part III.)

(For the use of guaiacol externally in fever see article on Guaiacol.)

Sthenic Fevers.

The application of antipyretics to the febrile temperatures occurring in sthenic cases has an entirely different purpose from their employment in a prolonged low fever of the adynamic type. There can be little doubt that in the sudden excessive outbursts of febrile temperature in a child from functional disorder, but with no acute disease underlying it, antipyretics are of value, and there are also reasons for their employment in the treatment of children and adults in order to favor popular prejudice. In America, at least, a physician visiting a case of croupous pneumonia for the first time, and finding the patient with a high fever, often would not be allowed to give the patient a cold bath if the friends could prevent it, and he must, in consequence, fall back upon antipyretics. Again, the fever of such cases cannot be prolonged enough to necessitate the use of antipyrin day in and day out for weeks at a time, and there is, for this reason, less danger of the patient being injured by its influence. In scarlet fever the use of such drugs should be most carefully watched, because the kidneys are in danger and the disturbances accompanying the fever may last a long time.

In pneumonia and erysipelas in strong persons antipyretics may be used. Lasting about a week in their febrile activity, these diseases are sometimes accompanied by sudden hyperpyrexia, which must be overcome. Usually it is best to accomplish this by the use of cold sponging or bathing, but sometimes where these methods cannot be used we are forced to employ antipyretic drugs.

In thermic fever, or sunstroke, the employment of antipyretics is often useless. The excessively rapid upward rush of the temperature responds in no way to drugs, and there are cases on record in which the use of antipyrin has utterly failed of good result. Thus, in one case reported by Singer a man suffering from thermic fever, with a temperature of 108 degrees, received 50 grains (3.3) of antipyrin hypodermically at 6 P. M.; at 7 P. M. he received 10 grains (0.65) more under the skin; at 8 P. M. 20 grains (1.3) more; and at 9.30 another 20 grains (1.3) were used without effect. In other words, 100 grains (6.6) in three hours and a half proved useless. In children suffering from excessive heat during summer weather antipyrin seems to be very useful, and has been highly recommended by Demme. It must be used with caution lest collapse be induced, and the author much prefers the use of cool sponging or baths.

Asthenic Fevers.

(Typhoid Fever and Fevers of a Typhoid Type.)

In the opinion of the author, antipyretics should play a secondary rôle in the reduction of the pyrexia of the typhoid state, our main reliance being upon cold applications, the antipyretics being used as an adjunct to the cold pack or bath. Aside from the fact that he has found such an opinion well founded in a large number of typhoid-fever cases, logical reasoning endorses its correctness. Even if antipyretics were perfectly innocuous, their constant use in fever would but give the already overstrained kidneys the task of their excretion, while the stomach, sufficiently disturbed by necessary medicines and illness, has enough to do without the addition of an additional load. Further than this, we know that these drugs are not perfectly harmless, and we also know that they act on the protoplasm of the body, and in consequence must gradually lose their power, which is not the case with the cold pack. The writer is sure that in typhoid and other low fevers of the continued type antipyretics should be given only when the cold pack cannot be used, or at the end of the cold application to prevent the temperature from bounding upward after its depression. (For Brand's treatment see Typhoid Fever.) Further than this, fever will sometimes resist all doses of antipyretics we can give or all that it is safe to give, but no fever can resist the cold bath. In diseases of a more chronic type, particularly those represented by phthisis, antipyretics are of doubtful value, owing to the increased sweating which is so apt to be produced, and unless the patient seems to be particularly robust they should not be employed except in the smallest effectual doses.

FRECKLES AND CHLOASMA.

The removal of freckles is readily accomplished, but their return is inevitable if any exposure to the sun or wind occurs. One of the best applications for their removal is a solution of corrosive sublimate, in water, varying in strength from 1 to 4 grains to the ounce (0.05–

0.2 : 32.0), and applied night and morning until the skin shows that it is irritated, when the lotion must be stopped for some days, after which its use may be begun again. A very efficient and much less dangerous remedy to leave about the room in which children are allowed to play is a saturated solution of boric acid in water, applied in the same manner as is the solution of bichloride of mercury.

Another remedy is lactic acid, 10 grains to a drachm (0.65 : 4.0) of water, used in the same manner as the solution of the bichloride of mercury. The following prescription is recommended by Unna:

℞.—Bismuth oxidi Pulv. amyli	āā gr. xxx (2.0).
Kaolini	ʒj (4.0).
Glycerini	fʒij (8.0).
Aquæ rosæ	q. s. ad f℥ij (64.0).—M.

S. Paint on spots and allow to dry, washing the drug off before each new application.

Or the following may be used:

℞.—Zinci oxidi	gr. iij (0.2).
Hydrarg. ammoniati	gr. iss (0.08).
Ol. theobromæ	fʒijss (10 0).
Ol. ricini	fʒijss (10.0).
Essent. rosæ	gtt. x (0.65).—M.

S.—Apply night and morning.

GASTRALGIA.[1]

The treatment of gastralgia may be divided into two parts—that directed to the relief of the attack when it is present, and that devoted to the prevention of other attacks. During the acute stage hot applications and drinks, aromatic and locally stimulating warm infusions, a few drops of chloroform, or brandy or whiskey hot and concentrated, or 30 or 40 drops (2.0–2.65) of laudanum may be used. Counter-irritation often does good, and in some cases, particularly if a suspicion of an hysterical element exists, a vigorous revulsive may act with surprising success. Emesis and purgation are sometimes indicated, since in the early attacks the cause of the pain may be suspected to be the presence of indigestible food.

The treatment required in the intervals between the attacks must vary with the cause and with the general condition of health. A careful search must be made for the real cause of the trouble, and when found it must be removed or palliated by appropriate measures.

The diet should be carefully regulated, and all the hygienic details of the patient's life be critically studied and directed. The avoidance of improper food, the abandonment of tea, coffee, and tobacco, the prescription of proper dress, exercise, or change of residence, may be followed by marked improvement in general health and by a cessation of the attacks of gastralgia.

In regard to remedies it may be premised that all depressing drugs must be avoided, as well as all purgatives which would weaken the digestion. Any marked disturbance of digestion should be corrected; and this may require the use of pepsin or of some tonic remedies, such as are suggested in the article on Indigestion. The chief reliance is, however, to be placed upon the administration of arsenic and iron immediately after meals, in proper form and doses. Thus, we may direct,

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[1] See article written by author in Keating's *Cyclopædia of Diseases of Children*, vol. iii.

℞.—Liquor potassii arsenitis . . . . fʒj (4.0).
Vini ferri amari . . . . q. s. ad f℥iv (128.0).—M.
S.—From 30 to 60 minims (2.0-4.0) in water after meals, three times daily, for a child of six years, or twice this quantity for an adult.

Or,

℞.—Tincturæ ferri chloridi . . . . f℥j (32.0).
Acidi hydrochlorici diluti }
Liquor acidi arsenosi } . . . . . āā f℥ss (16.0).—M.
S.—From 4 to 20 drops (0.2–1.3) in water after meals, three times daily.

Occasionally even better results are secured by the use of cod-liver oil in emulsion with the hypophosphites.

The solution of bromide of strontium (Paraf-Javal) is a valuable one in gastralgia in the dose of a tablespoonful (16.0) three times a day.

It is well, in cases where the pain is very severe, to combine with the above a powder of bismuth subnitrate and saccharated pepsin, given about an hour or an hour and a half after meals. Constipation, should it exist, must be overcome by proper diet, massage, enemata, or by suppositories of gluten or glycerin or soap. If the use of bismuth favors the continuance of constipation too decidedly, small doses of cyanide of potassium, dilute hydrocyanic acid, or chloroform may be substituted at the same hours. In cases where a highly neurotic state exists, it may be necessary to alternate all other treatment with the bromides or with the preparations of valerian, or the following prescription may be used:

℞.—Acid. hydrocyanic. dil. . . . . fʒj (4.0).
Ext. cannab. indicæ fl. . . . . fʒj (4.0).
Tr. hyoscyam. . . . . fʒj (4.0).
Spt. chloroformi . . . . fʒij (8.0).—M.
S.—30 minims (2.0) t. d. in water for an adult.

GASTRIC CATARRH (ACUTE).

By far the most important point in the treatment of acute gastric catarrh is the regulation of the diet, and the following abstract from the article written by the author for the third volume of Keating's *Cyclopædia of Diseases of Children* embodies so thoroughly the ideas which the writer desires to express that he has inserted it here: The dietetics may be divided into two parts—first, the regulation of the food during convalescence or during the attack, and, second, the character of the food to be used during the interval following one attack and preceding the next. Total abstinence from food in the acute stages of the attack, and absolute bodily and mental quietude, are advisable. There are several reasons for this. In the first place, the juices of the stomach are in an abnormal state and unfit to act properly if the stomach receive more food. Secondly, the mucous membrane of the stomach is already hyperæmic from the inflammation, and, as the normal viscus becomes physiologically hyperæmic on the ingestion of food, we would add to the congestion of the blood-vessels did we allow more nourishment to enter the stomach. Last of all, the excess of the mucus and lactic and butyric acids present renders any new food impure before it can be assimilated, and so prolongs the trouble. As the attack passes off small amounts of food may be given which should be of a kind readily digested and not likely to become easily decomposed or rendered acrid by the mucus in the stomach. Milk with a large percentage of lime-water is to be used, since the alkali not only prevents a too firm coagulation, but also decreases the secretion and acid reaction of the mucus. The thirst is often excessive, although anorexia is complete, and small pieces of ice may be administered for its relief. Commonly it will be found that the patient rapidly improves up to a certain point, then stops improving or relapses. This is sometimes due to an accumulation of mucus, which when mixed with food causes it to undergo fermentation. If marked evidences of the presence of this secretion are given, a mild and gently-acting emetic may be employed to dislodge the fermenting mass. In other instances the relapses depend upon a tendency to a condition of atony, which can only be overcome by prolonged and careful treatment adapted to the improvement of the general health. Sodium bicarbonate with compound infusion or compound tincture of gentian may be used during convalescence, and small sips of effervescing draughts are useful. If constipation exists and vomiting forbids the use of the ordinary purgatives, a Seidlitz powder divided into fourths or fifths, and taken in this way every fifteen minutes or half-hour, will settle the stomach, move the bowels, and often carry away mucus.

If there is much epigastric distress, a spice poultice is often of service.

Sweets and starches are to be rigidly denied the patient. If anæmia exists, iron may be used, but this is rarely needed.

The abdomen should be carefully protected with flannel, and draughts and unsanitary surroundings avoided.

The use of pepsin and of hydrochloric acid is to be much more carefully resorted to than has heretofore been the custom. As a rule, we are apt to forget that pepsin acts largely by catalysis, and that it is not secreted as pepsin, but as pepsinogen, a substance which is changed into pepsin in the presence of an acid. For this reason hydrochloric acid should be employed after inflammation has passed away, and pepsin given in large or small quantity according as there is reason to believe this ferment to be in normal or abnormal amount. Common salt (sodium chloride) is often beneficial, and should be always used, in moderation, with the food.

GASTRIC CATARRH (CHRONIC).

Chronic gastric catarrh is a condition of the stomach commonly seen in this country in a more or less well developed form. It is often associated with much indigestion and the eructation of sour liquids, or even with active vomiting. The secretions of the stomach are nearly always abnormal, and fermentative changes are constantly present in the gastric contents. Lavage is almost always to be resorted to for its relief. (See Part III. for Lavage.)

By far the best treatment for this condition is the use of counter-irritation over the epigastrium, the close regulation of the diet, and the use, internally, of nitrate of silver and extract of hyoscyamus, and, if great hyperacidity exists, the administration of the subnitrate of bismuth. Often, however, the better remedy is bicarbonate of sodium in the dose of 5 to 20 grains. In many instances the patient will be greatly benefited by the use of a Seidlitz powder or Carlsbad salt[1] or Saratoga Carlsbad water before breakfast each morning, as this washes out the stomach, dissolves the mucus, and unloads the mucous membrane of its congestion, at the same time overcoming any engorgement of the liver. Constipation is nearly always present, and should be removed by appropriate drugs, such as cascara sagrada, of which the best preparation is the fluid extract, rendered free from bitter taste by certain large manufacturers in this country, such as Parke, Davis & Company, or in the form of cascara sagrada cordial.

All fats, rich foods, strong meats, ham, bacon, or fried things are to be avoided, and only light broths, koumyss, or matzoon resorted to if the case be an obstinate or severe one. A nitrate-of-silver pill should be used half an hour before each meal, and be prescribed as follows:

℞.—Argenti nitratis . . . . gr. iv (0.2).
Extract. hyoscyami . . . . gr. x (0.65).—M.
Ft. in pil. No. xx.
S.—One, half to one hour before each meal.

In cases in which the chronic inflammatory process has gone on to atrophy of the tubules the use of hydrochloric acid is often of great value.

GASTRIC DILATATION.[2]

The treatment of dilatation of the stomach may be divided into two varieties—the first consisting of the methods of cure which are directed against the diseased state of the gastric walls themselves; the second, of those methods by which abnormal changes in the food and the gastric contents and secretions are combated, thereby allowing reparative changes to take place. As is well known, dilatation of the stomach may be dependent upon some constitutional or some local cause. If the cause be rickets, it is evident that the nutrition of the bony system and of the system in general is to be improved, and that remedies devoted to this object are to be given, such as cod-liver oil by inunctions, or, if the digestive apparatus will bear it, the oil may be given by the stomach. Lactophosphate of lime, phosphate of sodium, or iron, often in the form of the syrup of the iodide, should be used if any signs of struma are present. Good foods possessing large amounts of salts, yet easy of digestion, are under these circumstances particularly desirable, and by far the larger part of the treatment should be directed to the dietetics of the case. Of this the writer will speak farther on.

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[1] Artificial Carlsbad salt may be ordered, composed of 8 ounces of sodium sulphate, ½ an ounce of sodium chloride, and 1 ounce of sodium carbonate. The dose varies from 2 drachms to ½ an ounce (8.0–16.0).

[2] See article by author in Keating's *Cyclopædia of Diseases of Children*, vol. iii.

There are several means to be employed for the relief of gastric dilatation other than those which can be called medicinal, so far as drugs are concerned.

These consist, first, in efforts to evacuate the stomach and to cleanse it (see Lavage, Part III.); secondly, in attempts by these and other means to prevent its distention by the gases which arise or by the accumulation of ingesta which takes place; thirdly, in the regulation of the diet so as to avoid causes which have a tendency to increase the disorder.

Dilatation of the stomach is so difficult to cure that very satisfactory results are not to be looked forward to; nevertheless, the nutrition and the general state of heath are to be carefully considered.

The treatment of dilatation to be first considered is dietetic. There can be no doubt that one of the chief reasons for the emaciation which comes on is the failure on the part of the stomach to digest and assimilate nourishment. In addition to this, the intestine is really the place for absorption of food to take place, and the delay of the food in the stomach virtually makes the chyme unfit for the function of the small intestine.

The foods to be given are, of course, to be in the highest degree capable of ready assimilation, and should be confined, especially in severe cases, to the materials which we can readily predigest by the employment of the digestive ferments now so largely sold. Carefully-skimmed milk is valuable, aside from its inherent usefulness, in that it lacks the fats, which can be utilized only in the intestines, and which simply break down and decompose if kept in the stomach. Oyster broth, carefully freed from any oily matters in cooking and thoroughly pancreatized, is to be given. Ordinary whey obtained from milk by means of rennet is useful.

Rectal alimentation to some degree is always useful, and Ewald of Berlin suggests the following nutrient enema: Beat up two eggs with a tablespoonful of cold water; to this add a little starch, boiled in half a cupful of a 20 per cent. solution of grape-sugar and a wineglassful of red wine. The solution is to be well mixed at a temperature not high enough to coagulate the albumin, and injected as high up into the bowel as possible. For a child this mixture should be somewhat less in quantity than that given for the adult, particularly as to the wine.

An exceedingly important part of the dietetic treatment of gastric dilatation consists in the constant bearing in mind of the fact that the tendency of food is to accumulate, and the avoidance of the pernicious habit of adding solids or liquids to the quantity of ingesta still remaining from a previous meal. If the child is old enough, all the remains of previous feedings should be removed by lavage before anything more is given, since otherwise the sweet food is at once contaminated by the liquids which it meets in the stomach.

The medicinal treatment of gastric ectasy is, unfortunately, very limited, so far as the stomach itself is concerned, and, indeed, we doubt whether any direct medication can ever be of much value unless in the form of disinfectant substances, such as we have spoken of when speaking of lavage, and these only prevent decomposition of the food and do not effect a cure.

In a case of marked gastric dilatation we should, nevertheless, always resort to the bitter tonics, such as gentian or calumba, and for the improvement of the muscular coats of the viscus should employ the tincture or extract of physostigma in the dose of 5 to 10 drops (0.3–0.65) or ⅛ to ¼ grain (0.005–0.01), respectively. In the case of a child under the author's care a very extraordinary improvement followed the use of this drug and the careful fulfilling of all the directions just given except the lavage, which was not employed.

Another remedial measure which has been comparatively recently introduced is the faradization of the gastric walls by an internal and external electrode made for this purpose by electricians.

GASTRIC ULCER.

In the treatment of gastric ulcer three points must be borne in mind as being essential. These are, rest for the stomach as far as possible, rest for the patient, and the maintenance of the general health. The first of these points involves a consideration of diet. If in any case the stomach is very irritable, it is best to place the patient in bed and nourish her for from two to eight days by means of enemata. Probably the best form of nourishment for this purpose is a mixture recommended by Dreschfeld, and consisting of 2 raw eggs with 2 ounces (64.0) of beef-tea and a little brandy, which may amount to 1 ounce (32.0) if the patient really needs stimulants. It may be well to place a little pepsin in this injection to peptonize the proteids, but if this is done the alcohol must be left out, as it will interfere with the activity of the pepsin. Pancreatin may also be used with advantage in some cases in the amount of 5 or 10 grains (0.35–0.65) in each injection. For the relief of thirst, which may be excessive if rectal alimentation is resorted to, the patient should hold in the mouth small pieces of ice or drink moderate quantities of barley- or rice-water. After this treatment has been used for some days, small quantities of food may be given by the mouth, such as a little peptonized milk or a little warm milk with lime-water in the proportion of half and half, or 1 part lime-water to 2 of milk. After this thin arrow-root or gruel may be given in moderate quantity. It is better to give the food in small amount every two hours than in larger quantity three times a day. The increase in rations, both as to variety and amount, should be most gradual, the physician extending the dieting over at least six weeks, of which the first two had best be spent in bed. It is well to use massage and electricity under these circumstances to preserve nutrition, as in the rest cure. (See Rest Cure.) Beef-tea and soups had better be avoided during the early stages of the treatment, as they will irritate the stomach. Soft-boiled eggs, tender chicken or game, and minced lamb may be finally given. Cheese, coffee, tea, beer, and ale are to be avoided, as are all hot drinks. Fresh green vegetables may be used in moderation, but fresh bread and unripe fruit must be carefully avoided. When milk is taken it should be warmed. The presence of gastric pain indicates that the diet must be cut down in quantity and the nutrition maintained solely by rectal injection.

The drug treatment of these cases is both palliative as to pain and curative. For the pain counter-irritation of a more or less severe and constant type should be applied to the epigastrium, either as a spice or mustard plaster or by means of a hot-water bag. The counter-irritation should be as continuous as possible. Sodium bicarbonate and the subnitrate and subcarbonate of bismuth are also of service in the dose of 20 grains (1.3) each, and to these may be added from $\frac{1}{20}$ to $\frac{1}{4}$ of a grain (0.003–0.015) of morphine hydrochlorate or 1 grain (0.05) of codeine These may be given thrice daily if necessary. Only the smallest dose of morphine necessary to relieve the pain should be employed. By far the best treatment for the pain and for the ulcer itself is the following pill:

℞.—Argenti nitratis . . . . gr. iv (0.2).
Extracti hyoscyami . . . . gr. x vel xx (0.65–1.3).—M.
Ft. in pil. No. xx.
S.—One pill half to one hour before meals.

For the constipation which is frequently present the patient may receive a dose of Carlsbad salts or phosphate of sodium, or even the sulphate of magnesium.

For the relief of vomiting and of hæmatemesis absolute abstinence from food, so far as its administration by the mouth is concerned, is to be insisted upon. Nutrition must be maintained, under such circumstances, by the rectum. Small doses of cocaine, $\frac{1}{4}$ grain (0.015), may be given, or cocaine and bismuth subnitrate together if the vomiting is persistent. Sometimes drop doses of creasote are useful, or carbolic acid may be given in the same dose with 20 grains (1.3) of subnitrate of bismuth. One of the best remedies for hæmatemesis is oil of turpentine in the dose of 5 to 10 drops (0.35–0.65) four times a day. In other cases good results will often follow the use of the solution of the subsulphate of iron (Monsel's solution) in the dose of 3 drops (0.15) every half-hour or by the employment of 3 grains (0.15) of the salt itself in pill. Cold compresses or an ice-bag should be applied to the epigastrium.

Should perforation of the stomach occur, the prognosis is most gloomy unless inflammatory processes protect the peritoneal cavity, as often occurs. The tendency to peritonitis should be antagonized by the application of cold to the belly-wall, by the avoidance of food, by perfect physical rest, and by supportive treatment in the way of heat to the limbs and the hypodermic use of ether, brandy, or ammonia. Morphine should also be given freely unless collapse is too pronounced, as it tends to prevent abdominal pain and inflammation. Operative measures may be resorted to in suitable cases.

GASTRITIS (ACUTE).

This is generally due to the ingestion of irritant foods or drinks, rarely arising in its true acute form from other causes.

The treatment is to be directed entirely to the prevention of the spread of the inflammation and to the relief of that already developed. If the patient is seen soon after the onset of the trouble, the stomach is to be emptied of all irritant substances by means of vomiting induced by large draughts of warm water, or, better still, by the use of the stomach-pump, as the retching may increase the irritation. Mucilaginous drinks are to be given freely, and albuminous materials seem especially useful. Oils and similar protective liquids aid in preventing further damage. Opium, to allay pain and the local and systemic irritation, is invaluable. This drug should always be given in liquid form, and the deodorized tincture is the best in this respect, owing to its freedom from narcotine. Paregoric contains too little opium to be of value, and is irritating because of its volatile oil. If the stomach will not retain drugs, they should be given by the rectum. If evidences of collapse appear, hot applications, atropine, or belladonna should be exhibited. It is important that the heat should be applied over the epigastrium and chest, and a flaxseed poultice is the best method of doing this. Practically, the same rules hold good in regard to diet in both acute gastritis and in gastro-enteritis.

GASTRO-ENTERITIS.

Gastro-enteritis is a condition of inflammation affecting the entire alimentary canal in some instances, and commonly produced by the ingestion of some irritant substance, either in the form of bad food, poisons, or mechanical irritants, such as grape-seeds or cherry-stones. The symptoms accompanying it are exceedingly various, but consist chiefly in pain of a griping character with watery or mucous stools, or, if the inflammation be very severe, absolute and unyielding constipation may be present. The nervous symptoms depend upon the degree of irritation and the general nervous tendency of the patient, and if the trouble is very severe he may go on into a condition of shock or collapse.

If the irritation is very intense, exfoliation of the mucous membrane may take place, the epithelium coming away in shreds.

The treatment of gastro-enteritis depends upon its severity and cause. Almost always we first allay the pain and tendency to inflammation by the hypodermic use of morphine, and immediately follow this or precede it by an emetic of a non-irritating and rapidly-acting type, such as apomorphine, provided there is reason to believe that the poison or food still remains in whole or in part in the stomach. If the irritant has been taken some time before the physician is called in to see the case, emetics are contraindicated, as by disturbing the abdominal contents they render the inflammation worse. Following this, or in place of it if emetics are not useful because the poison has already passed through the pylorus, castor oil in the dose of 2 to 3 tablespoonfuls (32.0–48.0) to an adult may be given to sweep out the offending materials and lubricate the intestinal walls. In other cases sulphate of magnesium may be used, but not sulphate of sodium or Rochelle salt, as they are both irritant. The sulphate of magnesium is of value, because, in addition to its purgative effect, it also depletes the inflamed bowel. Having gotten rid of all offending materials, opium is to be freely used to allay irritation and control diarrhœa (see Diarrhœa), and hot compresses are to be applied to the belly, or a spice or mustard plaster used instead. Vomiting when it is excessive is to be treated in the manner described under that head. The after-treatment of acute gastro-enteritis is very important, both in respect to food and drugs. The inflammatory process, if severe, will have interfered with glandular action to such an extent that starvation from the non-assimilation of food may occur. Predigested foods are therefore in many cases indispensable, and a carefully regulated diet is a *sine quâ non.*

GLAUCOMA.

Glaucoma, or that disease dependent upon an increase of intra-ocular pressure, appears in an acute or a chronic form. The disease in general terms is characterized by halos appearing about the gas-light; periods of obscuration of sight; shrinking of the nasal half of the field of vision; narrowing of the anterior chamber of the eye; anæsthesia of the cornea; and increased tension of the eyeball. In the "glaucomatous attack," or acute glaucoma, the injection of the eyeball is intense; the lids swell, there is photophobia, the cornea is steamy, the pupil *dilated* and motionless, and the vision rapidly destroyed. The case may be mistaken for iritis or acute ophthalmia —a fatal blunder.

Iridectomy or an equivalent measure is the only treatment for glaucoma. If for any reason this is delayed, a solution of the sulphate of eserine, 1 to 2 grains to the ounce (0.05–0.1 : 32.0), or pilocarpine nitrate in twice this strength, should be dropped into the eye every two or three hours until relief follows. *Atropine must not be employed.* Hot compresses, opiates, and leeches are also useful to alleviate the pain if for any reason operation is delayed.

GONORRHŒA.

The therapeutics of urethritis varies in accordance with whether the disease is acute or chronic, and is very greatly modified by the seat of inflammation—a posterior urethritis, for anatomical and mechanical reasons, not being amenable to the same treatment which will prove successful when the disease invades the penile portion of the urethra.

The membranous and prostatic portions of the urethra constitute its posterior part. They are surrounded by layers of powerful muscles which keep the canal constantly occluded and which play the part of vesical sphincters. Hence any injection forced into the urethra passes to, but not beyond, its membranous part, and is worse than useless if administered with the intention of combating inflammation of the posterior urethra. It is the rare exception for gonorrhœa to be confined to the anterior urethra. Usually it extends back, and a common cause of gleet is failure to recognize this fact, and consequently the omission of measures calculated to cure the deep inflammation.

Since the general acceptance of the gonococcus as a specific cause of gonorrhœa the treatment of acute anterior urethritis has been mainly antiseptic, those drugs being chosen which are found to act most powerfully upon the specific germs, and at the same time produce the least irritant action upon the mucous membrane. Bichloride of mercury, as representing the most powerful germicide known to medicine, has been used most extensively. The main objection to its action lies in the fact that when employed in efficient strength it is exceedingly irritating. This effect may, to some extent, be avoided by using a large quantity in dilute solution, and one of the most satisfactory treatments yet advocated consists in thoroughly and repeatedly flushing the urethra with bichloride lotion, 1 : 20,000 or 1 : 40,000. This may be accomplished by means of a bulbous catheter provided with numerous small apertures opening backward just behind the enlarged extremity; immediately after urination the bulb is carried to the membranous portion of the urethra; the tube from an irrigator is then attached to the extremity of the catheter, and one or two pints of dilute mercury solution, as hot as can be borne, are injected. This may be repeated once or twice daily. When the urethra is so sensitive that the passage of an instrument is not practicable, a conical nozzle of a size to close the meatus entirely when inserted may be employed for irrigation. After first thoroughly washing the glans and lips of the meatus the nozzle should be inserted and held firmly in place. This ensures the passage of the injection back as far as the membranous portion of the urethra, beyond which it will not pass if the pressure does not exceed that obtained by elevating the irrigator two feet above the level of the urethra. When neither of these methods of irrigation can be practised, a syringe with a conical nozzle and with a capacity of at least 1 ounce may be employed: this should be used two to six times a day, two syringefuls of the dilute lotion being injected immediately after urination.

The liquid should be forced in very gently, being allowed to flow out by slightly lessening the pressure of the nozzle upon the meatus when the anterior urethra is full. When large injections are attempted by the ordinary small urethral syringe, the frequent application of the latter to the meatus occasions much irritation. It is desirable that the injection should pass back into the posterior urethra, since this portion of the canal is usually involved in acute inflammation.

Copious irrigations inaugurated in the earliest stage of gonorrhœa are frequently successful in producing a complete cure in a few days.

Much stronger solutions of mercury are frequently employed, the concentration depending upon the subjective sensations of the patient, and varying from 1 : 2000 to 1 : 6000.

The following prescriptions are among the most efficacious in checking the discharge:

℞.—Argent. nit.	gr. ss (0.025).
Aq. destil.	℥iij (96.0).—M.

S.—Locally in the subsiding stage.

℞.—Ext. hydrast (colorless)	fʒiv (16.0).
Bismuth. sublact.	ʒvj (24.0).
Glycerin.	fʒiv (16.6).
Aq.	q. s. f℥vj (192.0).—M.

℞.—Zinc. sulph. Acid. carbol. Alum. crud.	āā gr xij (1.0).
Aq. destil.	f℥vj (192.0).—M.

S.—Locally. Dilute if painful.

When the gonorrhœa has already assumed a markedly inflammatory type, with swelling and œdema of the penis, redness and eversion of the meatus, and great sensitiveness of the urethra, no injection should be employed. The penis should be wrapped in cloths kept wet with alcohol and water or lead-water and laudanum. With the subsidence of acute inflammatory symptoms and the appearance of copious discharge the injection treatment may be inaugurated. It must be remembered that injections may in themselves prevent the discharge from entirely disappearing. Hence, as the symptoms ameliorate the injection should be made less frequently, finally being entirely omitted for some days if the discharge seems to continue longer than usual.

Internal medication and constitutional treatment are most important in all forms and stages of gonorrhœa. It is almost universally accepted that certain drugs, such as copaiba, cubebs, and oil of sandalwood, when eliminated through the kidneys, possess the power of inhibiting the growth of the gonococci or of destroying their vitality. Bacteriological research has shown that of this class of remedies copaiba alone possesses such power. To this drug may be added salol, which has been proved by laboratory and clinical tests to exert a powerful germicidal action upon the gonococcus. Clinical experience has shown that oil of sandalwood is of great value in the treatment of acute gonorrhœa. An excellent formula for the administration of balsams is the following:

℞.—Ol. santal. . . . . gr. v 0.3 .
Balsam copaib. . . . . ♏v 0.3 .
Ol. cinnamom. . . . . ♏j 0.05 .—M.
Encapsulate.

These capsules should be taken one hour after meals, from six to twelve being administered.

Obstinate chordee may require bromide of potassium and chloral. Of these a drachm of the former must be given at bed-time, and 10 grains of the latter; this may be repeated in the night if painful erections persist. Lupulin in 30-grain (2.0) doses is also endorsed. When practicable, opium or belladonna suppositories, or hypodermic injections into or about the perineum of morphine gr. $\frac{1}{4}$ (0.015) and atropine gr. $\frac{1}{60}$ (0.001), will prove very satisfactory. In all cases the patient should be instructed to rise once during the night and pass his water.

Ardor urinæ is usually relieved by the use of demulcent drinks and by the employment of bicarbonate of sodium or citrate of potassium in sufficient doses to render the urine but slightly acid. Either of these drugs is conveniently administered in the form of compressed tablets, taken one or two hours after meals in 10-grain (0.65) doses, the quantity being increased, if necessary, until the desired effect is produced on the urine. The instillation into the urethra, by means of an eye-dropper, of a 4 per cent. solution of cocaine a few minutes before urination markedly diminishes the burning. Finally, this symptom may often be relieved by instructing the patient to pass his water with the penis submerged in a vessel containing water as hot as can be borne.

Where the inflammation is of a high grade and attended by fever and general malaise, the administration of 2 drops (0.1) of aconite repeated every two or three hours is followed by marked relief.

In regard to the general treatment of a patient suffering from gonorrhœal urethritis rest in bed is particularly desirable. This, however, is rarely possible, and the surgeon must be content with enforcing the avoidance of all active exertion and the observance of as much rest of mind and body as is compatible with the continuance of the daily routine of business life. While skimmed milk or buttermilk diet is theoretically desirable, the advantages to be gained by it are scarcely sufficient to justify insistence upon such a regimen, especially as it would excite suspicion as to the presence of venereal disease; hence a light diet, consisting mainly of vegetables and fruits, and in quantity about half that usually taken, with a minimum amount of meat, should be advised. In addition the patient should be induced to drink liberally of plain water or any of the sparkling mineral waters, as by this means the urine is not only rendered bland, but greatly increased in quantity, thus enabling the urethra to be fully flushed from behind many times a day. Flooding of the stomach with such large quantities of liquids as to produce dyspepsia is to be carefully avoided. It is scarcely necessary to state that copulation or any form of venereal excitement must be strictly interdicted. Finally, prolonged warm baths lasting from half an hour to two hours seem to exert a favorable influence upon local inflammation.

Acute posterior urethritis does not usually develop until the disease of the penile portion of the urethra has run a course of two or three weeks. During the very acute symptoms local treatment applied to any portion of the urethral canal probably aggravates the condition, and even the internal administration of balsams and antiseptics must be employed with very great caution, their use being suspended at once if the inflammation seems to be aggravated by their employment. Hence, when in the third week of gonorrhœa there is a violent outbreak of inflammation in the membranous and prostatic portions of the urethra, suspension of all active treatment is indicated. The bowels are kept open; the diet is carefully regulated; the urine is rendered bland, unirritating, and antiseptic; continued warm baths are ordered, the painful symptoms being controlled by opium and belladonna, administered either hypodermically or in the form of a suppository. When the acute symptoms subside the quantity of antiseptics taken by the mouth may be increased, balsams may be added, and local treatment may be directed first to the posterior urethra, after the cure of which the anterior urethritis should receive attention. It has been stated already that injections forced into the meatus rarely penetrate beyond the bulbous portion of the urethra; hence to influence the deeper portions of this canal some other method of applying these drugs must be devised. This end is best accomplished by means of Ultzmann's irrigation catheter or other instrument similar in principle.

The patient is first instructed to empty the bladder of a portion of its contents; by this means the urethra is flushed out. The catheter is then introduced into the membranous portion of the canal, and by means of a syringe 1 ounce (32.0) of the injection is forced into the membranous and prostatic portions of the urethra. This fluid does not regurgitate along the sides of the catheter, but enters the bladder, and is passed with the urine at the next act of micturition. The injection most employed is the following: Nitrate of silver, grain $\frac{1}{4}$ to 1 (0.015–0.05); distilled water, ℥j (32.0); carbolic acid, 1 grain to the ounce. Any of the injections used in anterior urethritis may also be then employed. These injections should be made twice a week.

Chronic Gonorrhœa.

Chronic gonorrhœa differs from the acute form in the fact that the inflammation is distinctly localized in certain portions of the urethra, and does not invade the whole canal with uniform intensity; hence, efficient treatment must be directed not to the whole urethra, but to the diseased areas. Foci of chronic urethritis are usually found either in the bulbous portion of the urethra or in the membranous or prostatic portion. If the disease is located in the anterior urethra, it will commonly be found to depend upon the existence of a structure of large calibre. The passage of sounds of full size—cutting the meatus if this is necessary for their introduction—will be followed by prompt relief in such cases. The sounds should be used not more frequently than twice a week, and should be most carefully sterilized before introduction.

If after free dilatation the discharge still persists and a large portion of the anterior urethra is in a catarrhal condition, as shown by examination of the urine, irrigation of the urethra should be practised. This may be best effected by passing a soft-rubber catheter down to the membranous portion of the urethra, and injecting through it once daily 3 ounces (96.0) of a ½-grain-to-the-ounce (0.025 : 32.0) solution of nitrate of silver. When the general catarrhal condition is materially modified, by means of an ordinary hard-rubber endoscope and a head-mirror, the focus of inflammation may be exposed, and may be treated directly by strong astringent solutions carried in by means of a brush or by absorbent cotton secured to the extremity of a long applicator. Nitrate of silver or sulphate of copper, 20 grains to the ounce (1.3 : 32.0), may be employed. Unna has devised a most successful treatment for obstinate cases of gonorrhœa. He advises coating the sounds with the following mixture:

℞.—Ol. cocœ	℥iij (96.0).
Ceræ flav.	ʒss (2.0).
Argent. nitratis	gr. xv (1.0).
Balsam. Peruvian	ʒss (2.0).—M.

This is liquefied in a water-bath; the sounds are dipped in it and are then hung up to dry. On being passed the heat of the body melts the coating. The objection to their use lies in the fact that the application is made to the entire urethra. Practically, however, their employment is often followed by brilliant results.

Chronic posterior urethritis must be treated by remedies applied directly to the diseased area. Nitrate of silver is more commonly successful than any other medication. By means of Ultzmann's apparatus 3 or 4 drops (0.25–0.3) of a solution varying in strength from 0.1 per cent. to 5 per cent. may be employed.

Finger recommends the following ointment:

℞.—Argent. nitratis vel cupri sulph.	gr. xv (1.0).
Lanolin.	℥iij (96.0).
Ol. olivæ	ʒjss (6.0).—M.

By means of an ordinary catheter—which is first filled, then in duced until its eye reaches the prostatic portion of the urethra definite quantity of the ointment can be forced into the canal b graduated rod.

In many cases pressure will exert a curative action, causing pro absorption of inflammatory effusion. To accomplish this result la sounds may be passed into the bladder. Frequently the therapeu influences of cold, together with pressure, are found beneficial. T best means of combining these two remedies is found in the psych phore, an instrument in the shape of a sound, but so arranged tha stream of water flows through its interior.

It must be borne in mind that chronic gonorrhœa is commonly d to unskilful or not sufficiently prolonged treatment of the acute stages. Not only should the treatment of acute gonorrhœa be continued until the gonococci have entirely vanished, but for fully two weeks after the disappearance of all symptoms of inflammation. The same rule holds good in regard to the chronic manifestations of the disease. Only after careful examination of the urine fails to show any sign of inflammatory trouble for at least two weeks should the treatment be suspended; and this should not take place suddenly, but the intervals between the applications be gradually increased in length, the patient being carefully watched in the mean time.

Per contra, it must not be forgotten that long-continued irritant treatment may in itself indefinitely prolong a urethral discharge. Hence it is wise to suspend all injections in certain cases, and to examine the discharge carefully, as found in the urine, to determine whether or not the continuance of symptoms is dependent upon this cause.

There is a mucous secretion which quite frequently follows gonorrhœa, but which is in no way dependent upon the persistence of this disease. Microscopic examination will at once determine its nature. It is probably most rapidly cured by attention to general hygiene and by tonic and supporting treatment.

Complications of Gonorrhœa.

Among the many local and general complications which may occur in the course of an acute or subacute gonorrhœa are balanitis, balano-posthitis, prostatitis, and epididymitis.

Balanitis and *balano-posthitis* are treated by perfect cleanliness. The discharge must be thoroughly washed out, and the surface must be dried and isolated. The thorough cleansing of the parts is best accomplished by weak astringent solutions, such as the chloride of zinc, 4 grains to the ounce (0.2 : 32.0), 1 per cent. boric acid, or 1.5 per cent. carbolic acid; nitrate of silver is particularly valuable, and in the proportion of 1 grain to the ounce (0.05 : 32.0) will be found sufficiently strong for use as a wash or injection. The superficial ulcerations may be further touched with the solid stick of the nitrate of silver. The prepuce having been retracted and the parts having been thoroughly washed, dusting powder, such as tannin or oxide of of zinc, is distributed over the surface of the inflamed parts; the glans is then covered with a thin layer of absorbent cotton and the prepuce drawn forward. This dressing is to be repeated three times daily.

If the phimosis is so tight that the prepuce cannot be retracted, cleansing, astringent injections, and wrapping the penis in one or two thicknesses of gauze or other thin fabric, constantly kept wet with dilute lead-water, will be the treatment indicated. If, in spite of this treatment, inflammatory symptoms become more marked, circumcision is indicated.

Prostatitis rarely develops before the second or third week in the course of urethritis. Where the acute symptoms are fairly developed direct local treatment is of little avail. Rest in bed, light diet, careful regulation of the bowels, medication to render the urine bland and unirritating, elevation of the pelvis, local depletion by means of leeches applied to the perineum, and the administration of morphine and belladonna, either by means of suppository or by hypodermic injection, represent the general treatment of all inflammatory conditions at or about the neck of the bladder. In the great majority of cases prostatitis undergoes prompt resolution, and this is more powerfully influenced by rectal injections than by any other method of treatment. For this purpose a two-way rectal tube must be employed, the nozzle of which is directed against the projection of the prostate into the bowel. From 2 to 4 quarts (2 to 4 litres) of water, either very cold or as hot as can be borne, are allowed to flow into the rectum by gravity, this arrangement of the tubes allowing the injection to flow out as rapidly as it flows in. This treatment should be repeated three or four times a day. When, in spite of careful treatment and the free use of anodynes and antispasmodics, there is retention of urine, a soft catheter should be passed into the bladder and allowed to remain there.

If general and local symptoms denote abscess-formation, the pus should be evacuated by perineal incision as soon as its presence is positively determined upon. It is true that the pus collection usually is spontaneously discharged into the urethra, but this result cannot certainly be depended upon, and, at best, is an unsatisfactory termination of the trouble.

When the inflammation runs into a chronic type, the treatment suitable for chronic posterior urethritis is indicated—namely, the use of large cold steel sounds and local applications to the prostatic urethra. In addition rectal injections, by means of the two-way tube, are very efficient in producing a cure.

Epididymitis requires rest in bed, cessation of all local treatment directed against the gonorrhœa, the elevation of the pelvis and testicles, and the systemic treatment applicable to acute inflammation. The general tendency of this complication of gonorrhœa is toward spontaneous resolution. The testicles may be supported by a handkerchief bandage, the base of which is passed beneath the scrotum while the ends and apex are secured in front to a circular band passing about the waist. To combat the agonizing pain and hasten the cure punctures have been advised. These, by relieving tension, promptly alleviate the suffering. Ice-bags may also be applied, though it is claimed that as a result of this treatment there remains an obstinate induration of the epididymis. Local applications of the nitrate of silver and of tincture of iodine are also said to act beneficially.

Since it is usually impossible for a patient suffering from gonorrhœal epididymitis to keep to his bed, a treatment must be devised which will allow him to attend to his business, and at the same time will prevent the inflammation from becoming aggravated. The part must be splinted: if at the same time uniform pressure can be applied the cause of the trouble will be still further favorably modified. These indications are complied with, partially at least, by strapping the injured testicle. For this purpose a number of adhesive resin strips, each half an inch wide and long enough to pass three-fourths around the swelled testicle, are cut. The first strip encircles the scrotum between the affected testicle and the body, tightly imprisoning the former in a pouch of skin. The succeeding strips are then placed, each overlapping the other in such a manner that the entire pouch is covered in, and a handkerchief bandage, applied as described above, may then be used to elevate the testicle. A better means of securing rest and pressure, and at the same time exerting the resolvent influences of heat and moisture, is offered in the dressing proposed by Horand-Langlebert. The entire scrotum is first enveloped in a thick layer of cotton; over this is placed a piece of rubber-dam sufficiently large to cover in the cotton, and the dressing is completed by an ordinary suspensory, gored at the sides and provided with tapes to allow of close fitting. Unless there be decided swelling of the spermatic cord, this dressing usually allows the patient to attend to his business, and is followed by as prompt resolution as though confinement to bed had been insisted upon. When the acute symptoms have disappeared attention must be directed to the removal of infiltration, which if it persists may be a cause of sterility. This is accomplished by the continuance of heat, moisture, and pressure; by local applications, such as iodine gr. iv (0.25) in lanolin ℥j (32.0), or of equal parts of mercury ointment and belladonna ointment, or by ichthyol, with lard half and half, and by the internal administration of iodide of potassium, 10 to 20 grains (0.65–1.3) three times daily.

Gonorrhœa in the Female.

The symptoms of acute gonorrhœa in the female are usually so mild that the attention of the physician is rarely called to the disease until it has reached its chronic form and has invaded the uterus and its appendages. When, however, acute urethritis is found, the treatment, both local and general, is conducted on the same principles as when the disease attacks the male urethra. During the most acute stage no local treatment is advisable, but subsequently injections can be made with the ordinary hard-rubber syringe, not more than a drachm and a half of the liquid being employed at a time. If the urethral discharge persists, the seats of the suppuration are readily found by the endoscope tubes, and treated directly by applications of strong solutions of nitrate of silver or sulphate of copper. The results of treatment are commonly satisfactory.

Acute vaginitis is not very frequently observed, excepting in children and young girls. In addition to the general treatment of inflammation, local treatment directed to cleansing thoroughly the inflamed surfaces of discharge and acting upon them by a strong antiseptic lotion will be followed by a rapid cure. The patient is instructed to irrigate the vagina three times daily with 2 pints (1 litre) of bichloride-of-mercury solution, 1 : 4000, thrown in by means of a fountain syringe. For this fluid to reach every portion of the diseased mucous membrane it is necessary that the patient should lie upon her back with the hips elevated. Before rising a pledget of absorbent cotton is placed between the labia. During the most acute stage of vaginitis hot-water injections and prolonged hot sitz-baths are indicated. In addition to the antiseptic irrigations which the patient is directed to make, the physician should every second day insert a speculum and paint every portion of the diseased mucous membrane with nitrate-of-silver solution varying in strength from 4 to 40 grains to the ounce (0.25–2.65 : 32.0). The vagina should then be packed with tampons of absorbent cotton, which may be dusted with astringent medication.

Vulvitis corresponds to balanitis in the male, and is treated in a similar manner. Cleanliness is the most essential point in securing a cure. The parts are thoroughly washed with weak antiseptic lotions, and the abraded mucous surfaces are kept from coming in contact by means of a layer of absorbent cotton or a piece of lint soaked in dilute lead-water or other mild astringent solution.

GOUT.

Gout is a word used to signify a series of manifestations occurring chiefly in those who have led a lazy, sluggish life and have lived on the fat of the land. and partaken more frequently of alcoholic beverages than of water; or it occurs in persons who do not live in this way, but whose ancestors will be found to have done so, and to have handed down to them the gouty taint or diathesis; or, once more, in those who have had poor food for a long time. In other words, it is a disorder of nutrition and metabolism. Very few Americans have gout in its marked and characteristic forms, owing to the active life pursued, and to the fact that the inhabitants of the Western hemisphere drink large amounts of water, thereby continually dissolving effete matters in the system and washing them away. The therapeutic importance of pure water in this state is remarkable, and the so-called lithia waters depend for their value more upon their freedom from salts than their presence. When a patient goes to medicinal springs he simply acts as a sluice-way, and by continually drinking water washes out the kidneys and prevents deposits of calcareous matters throughout the body. In a gouty individual the liquids of the body may be said to be so overladen with salts that they deposit them wherever a spot is found which is easy of access, just as water laden with lime forms a deposit on the sides of its bed when a drought comes on, and dissolves and removes these formations when a freshet takes place. Very often, when such waters are not attainable, satisfactory results will be reached by ordinary distilled water, the insipid taste of which can be overcome by charging it with carbonic acid gas.

When an acute attack of gout comes on, it is generally situated, as is well known, in the joint of the big toe or other toes, but it may involve any part of the body, even to the heart and the abdominal viscera. By far the best remedy for the relief of the pain is morphine, which should be given hypodermically. At the same time the best remedy for gout that we have, colchicum, should be freely given until the patient shows the full effect of the drug, as evidenced by gastro-intestinal discomfort or pain and slight laxity of the bowels. The drug should be used in the form of the wine of the root, not that of the seeds, in the dose of 20 drops (1.3) at first, and increased by 1 drop (0.05) every four hours until relief is obtained or symptoms of poisoning appear as noted above. In other instances the method of administration suggested in the article on Colchicum may be resorted to.

The local treatment of gout, when it is active, consists in the application of a number of remedies. For hospital practice a very useful mixture is made by adding 1 part of bicarbonate of sodium to 9 parts of linseed oil. The joint is then wrapped in a piece of lint soaked with this concoction. In other cases collodion may be applied in one or two good coats, not more, with relief, and in still others oil of peppermint has been recommended. It is to be remembered, however, that the inflamed joints are not to be treated by depletion through leeches or bleeding, as by this means they ultimately become worse; or, in other words, the treatment of gouty inflamed joints is not identical with that of inflamed joints from other causes. When the pains of acute gout are very severe at night, potassium iodide, in the dose of 15 grains (1.0) at four or five o'clock in the afternoon, will sometimes give relief; this drug should always be combined with colchicum if the disease is subacute or chronic.

In chronic gout, except during the acute exacerbations of the disease, colchicum is almost useless, but potassium iodide should be pushed to the point of iodism if the trouble be painful. Here diet comes in for a great part of the treatment, and should consist of foods which are not fatty nor rich, but plain and nourishing. Milk and eggs, the white meat of chicken, and fruits cooked without sugar being added are allowed, tea and coffee being used only in moderation. If any wine is taken, it must be followed by copious draughts of pure water, and this last article should be used *ad libitum*. On the other hand, pastries, and, more than all, sweet wines, are the worst things that such a patient can take, and must be absolutely prohibited.

The insomnia of chronic or subacute gout is best put aside by potassium bromide and chloral, the former drug being the safest and best.

Nothing should be done in the neighborhood of gouty joints which will injure the skin, as it is easily disorganized and its injury may lead to erysipelas. Where the deposit around the joints is very great and the normal movements are impossible, relief is often obtained by the application of a solution of citrate or carbonate of lithium, 5 to 10 grains to the ounce (0.35–0.65 : 32.0) of water, on lint wound around the parts. Where the skin is broken and will not heal, this treatment often permits healing by dissolving the crystals in the wound which prevent the approximation of the edges and so cause local irritation. Iodine ointment or the tincture of iodine is often placed around chronic gouty joints with advantageous results.

A standard remedy in subacute or chronic gout is arsenic, and its administration in the form of 3 drops (0.15) of Fowler's solution, with either perfectly pure or lithiated water, is always to be resorted to. If anæmia is present, arsenic is particularly indicated, and cod-liver oil and syrup of the iodide of iron are also of value in this state.

We find, therefore, in conclusion, that the use of large amounts of pure water devoid of salts, and the administration of colchicum, potassium iodide, and arsenic, are the greater points about which the rest of our treatment should centre. In those cases where retrocedent gout comes on the heart must be supported by stimulants, particularly by hypodermic injections of ether until the slower drugs can act, by heat over the belly, by the use of opium to allay irritation, except when the brain and kidneys are seriously affected, by the use of diuretics and alkaline drinks, and finally by counter-irritation in the shape of a mustard plaster placed over the abdomen or chest as the case may require.

HEMORRHAGE.

(*Including Menorrhagia, Metrorrhagia, Hæmoptysis, Hæmatemesis, Intestinal Hemorrhage, Hæmaturia, and Post-partum Hemorrhage.*)

Under this heading the author will consider all forms of hemorrhage which can be controlled by drugs or measures not directly surgical in their scope, with the exception of epistaxis, which has already been spoken of.

Whenever a hemorrhage can be arrested by the application of a ligature or by compression, as in a cut of the finger or some similar wound, no styptic should be used. Styptics are employed for the double purpose of constringing the tissues and coagulating the blood, and, in consequence, form coagula which tend to make a nasty septic mass about the wound. In their place the physician should resort to a compress soaked in some antiseptic liquid or filled with some disinfectant powder, and if this fails to control the bleeding, then ligation of the bleeding vessel becomes necessary.

Where the bleeding point cannot be reached by direct compression or for ligation, the use of packing and of astringents is advisable, and drugs which are antihemorrhagic should be used by the mouth. As these forms of hemorrhage are generally given separate names, they will be so considered.

In all forms of hemorrhage in which the flow has been sufficiently great to endanger the patient's life resort should be had to hypodermoclysis or to transfusion. (See Hypodermoclysis and Transfusion, Part III.)

Menorrhagia is an excessive flow of menstrual blood, either excessive in quantity during two or three days or prolonging itself over an unusual number of days, while *metrorrhagia* is a state in which bleeding takes place from the uterus independent of menstruation and at any period of the month, or even after the menopause has occurred.

Menorrhagia, or excessive menstruation, is not to be judged by the amount of the flow, but by whether the loss is sufficient to cause decrease of health or to indicate disease. In some cases it is a means of relieving plethora.

When the physician decides that something should be done to improve the condition of the patient, when suffering either from menorrhagia or metrorrhagia, it will be necessary for him to find out whether a polypus or other form of uterine disease is directly responsible for the trouble, and in the mean time to employ drugs known to act favorably upon uterine hemorrhage. The most prominent of these drugs are ergot and oil of erigeron, the first being the more active and the best remedy for active bleeding, the second better for oozing and for cases where there is a continual "show."

The fluid extract of ergot may be given in varying dose, from 10 to 60 drops (0.65–4.0), according to the necessities of the case, and the oil of erigeron in capsules in the dose of from 3 to 5 minims (0.15–0.3), or, if capsules cannot be had, the physician must employ the oil in an emulsion made by using syrup of acacia or other similar substance.

Where menstruation is irregular and the menorrhagia is almost a metrorrhagia, bromide of potassium or sodium in the dose of 10 grains (0.65) once or twice a day is often very serviceable indeed, and the distilled extract of hamamelis in the dose of 1 drachm (4.0) three times a day is almost as useful. Cannabis indica, if an active sample is obtainable, is also said to be of service, but the writer has never used it to any extent. Oil of cinnamon in the dose of ½ drachm (2.0) is very efficacious in the slow oozing of some cases where erigeron cannot be used or obtained. Sometimes, where congestion of the pelvic viscera is the cause of the trouble, dry cups over the sacrum give relief.

Hæmoptysis, or hemorrhage from the lung, is nearly always due to tubercular ulceration of a small or large blood-vessel, and the life of the patient depends in reality more upon the rapidity with which a clot naturally forms than upon the skill of the physician. Though text-books order atomized solutions to be inhaled and other remedies to be taken by way of the lung, in most cases these measures will be found impracticable, simply because the nervousness of the patient and the constant cough will not permit of inhalations to any extent, and even if a full breath is taken, it generally increases the bleeding and coughing. The only occasions on which inhalations of styptics are of service are those in which the hemorrhage is just beginning or so slight as to streak the sputum or to be at least thoroughly mixed with it. The solutions to be so employed must be used in an atomizer which will throw a fine spray—sufficiently fine to enter the smallest air-tubes with the inspiratory wave of air. A very good fluid is one made from Monsel's solution, as follows:

℞.—Liquor. ferri subsulphat. . . . . gtt. xx to xxx (2.0).
Aquæ dest. . . . . f℥iv (128.0).—M.
S.—Use in an atomizer every few minutes.

Or the following:[1]

℞.—Acid. tannic. . . . . gr. xx (1.3).
Glycerini . . . . fʒij (8.0).
Aquæ dest. . . . . q. s. ad f℥iij (96.0).—M.
S.—Use in an atomizer.

Or,

℞.—Aluminis . . . . gr. vj (0.4).
Aquæ dest. . . . . f℥iij (96.0).—M.
S.—Use in an atomizer.

Some clinicians advise that the patient should swallow, whether the hemorrhage be acute or not, not less than 1 to 1½ drachms (4.0–6.0) of the fluid extract of ergot, or a solution made by adding 20 grains of gallic acid to 1 ounce (1.3 : 32.0) of water. Tannic acid given by the stomach is not as good as gallic acid, because it must be absorbed and changed into gallic acid before it can reach the bleeding point through the circulation. On the other hand, the tannic acid, if locally used, is the better, for it constringes the tissues and forms a clot, whereas gallic acid does not coagulate the blood. There is no doubt that of all the internal remedies for hemorrhage from the lungs, aconite is the best. Careful studies show that ergot causes primarily an increased flow of blood to the lung, although its dominant and final action is to cause contraction of the blood-vessels. Hemorrhage from the lung is to be regarded as any other hemorrhage. The object of the physician is not to stimulate the heart and vasomotor system, thereby increasing the leakage from the bleeding vessel, but to lower the arterial pressure to as low a point as is safe. The rule to follow is best stated as follows: If the patient is seen early in the attack, give full doses of aconite to prevent further hemorrhage. If when seen so late that he is too much exsanguinated to use sedatives, place his head lower than the feet and apply Esmarch bandages to the limbs to keep the blood in the vital parts as far as possible. The use of stimulants can only increase the hemorrhage by increasing the pumping power of the heart and by dislodging the clot from the eroded blood-vessel.

Daremburg and Yeo have employed ice or ice-cold compresses to the scrotum or vulva in such cases, and claim good results from this use of cold.

To allay nervous excitement many writers advise that a hypodermic injection of morphine should be used. The author is convinced that this treatment is irrational, for morphine is a circulatory stimulant, and by increasing the power of the heart increases the hemorrhage. Chloral and the bromides are much better remedies, and should be given by the mouth, or, if vomiting is present, they should be given by the rectum, dissolved in starch-water. (See Chloral and Bromides.)

Sometimes the patient can point directly to the spot where the hemorrhage exists, and under these circumstances a dry cup or a piece of ice placed over this point may prove useful.

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[1] If the Monsel does not stop the hemorrhage, the tannic acid will probably fail, but, more important still, the two should not be used together, as the tannate of iron will be formed, which is as black as ink.

After an attack of hæmoptysis there is great danger in many cases of a traumatic pneumonia being set up by the presence of the extravasated blood. This should be combated by the use of a carefully regulated diet, and the reduction of any arterial excitement by small doses of aconite in persons *not weakened by advanced disease or bleeding*. Complete rest in bed is to be insisted on, and no stimulants allowed in food or drink unless the weakness of the patient requires it.

Hæmatemesis.—This depends either upon some injury to the stomach or, much more commonly, upon gastric ulcer, cancer, or some other severe form of gastric trouble, and is one of the easier of the so-called "internal hemorrhages" to treat, because by ordering the patient to swallow styptic drugs we can act directly upon the bleeding surface.[1] In such a case small pieces of ice should be swallowed frequently, and this may be accompanied by 3 drops (0.15) of Monsel's solution in a half tumblerful of water every fifteen minutes till four doses are taken. Tannic acid may be given instead in the dose of 20 grains to a drachm (1.3–4.0), but the two should never be given at once in the same case. (See foot-note to p. 539.) Monsel's salt may be given in pill in the dose of 2 to 3 grains (0.1–0.15). The acetate of lead is also of value in pill form in the dose of 2 to 3 grains (0.1–0.15) with morphine or opium. Tincture of the chloride of iron, the sulphate of iron, turpentine, ipecac, ergot, and hamamelis may all be used, the last three particularly in slow or passive hemorrhages. Sometimes nitrate of silver in the dose of ¼ of a grain (0.016) in pill form is of service if the hemorrhage is a slow one.

Hemorrhage from the bowel is to be treated according to its point of origin. If in the small intestine, as from ulceration of Peyer's patches or other glands, the medicines must be used by the mouth; if it be from the colon or rectum or from hemorrhoids, medication must be by way of the anus.

Hemorrhage of the first class is best combated by the application of a small piece of ice to the belly and by the use of Monsel's salt (ferri subsulphas): 3 grains (0.15) made into a pill should be given every half-hour or oftener, the pill being made hard enough to reach the intestine without being dissolved and decomposed in the stomach.

Ergot has been largely resorted to, but is of doubtful value, but tannic acid may be given with advantage in large amount in solution or pill if the Monsel's salt is not obtainable. The other remedies which are of service are sulphuric acid in the dose of 5 to 10 drops (0.3–0.65) in water in acute or passive bleeding, or turpentine given in capsule, or, better still, in emulsion with acacia in the dose of 10 drops (0.65) every half-hour, particularly when the hemorrhage is not active. Acetate of lead and camphor in the following pill may be of service in some cases:

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[1] Hæmatemesis also ensues as a result of swallowing blood which has escaped into the mouth or naso-pharynx, and this symptom is sometimes induced by malingerers in order to further their ends. These forms of hæmatemesis should, of course, be separated from those dependent upon some lesion in the stomach itself.

R.—Plumbi acetatis . . . . gr. v (0.3).
Camphoræ . . . . gr. x (0.65).—M.
Ft. in pil. No. v.
S.—One pill every hour.

Where the hemorrhage is dependent upon ulceration of the colon or rectum injections are to be resorted to. These are both styptic and curative, the styptic injections being particularly useful when the bleeding is to be stopped at once, the others where it is sought to remove the condition producing the trouble.

To the first class belong alum, sulphate of copper, Monsel's solution, sulphate of iron, tannic acid, and cold water. In the second w find nitrate of silver, the sulphates of copper and of iron, and th chlorate of potassium.

The alum solution used should be fairly strong, 10 grains to the ounce (0.65 : 32.0); the copper, 5 grains to the ounce (0.3 : 32.0); the Monsel's salt, 10 grains to the ounce (0.65 : 32.0); or ½ to 1 drachm of Monsel's solution to each 2 ounces (64.0) of water. The tannic acid should be used in the strength of 20 grains to the ounce (1.3 : 32.0) of water and glycerin. When chlorate of potassium is used it should be employed in saturated solution in small injections (25 grains to the ounce [1.65 : 32.0]), or weaker if the injection be a large one (10 grains to the ounce [0.65 : 32.0]).

These injections should be carefully given, and the success or failure attending the treatment of these states depends as much upon the *technique* of the operation as upon the injection of the medicinal substance. It should never be forgotten that an injection designed for local medication should be as small in bulk as circumstances will permit. Thus, in inflammation of the rectum the amount of the injected liquid should not be above 4 ounces (128.0) at the utmost, and preferably 2 ounces (64.0) unless the diseased area is high up. An enema is given in bulk so as to cause distention and excite the bowel to movement, whereas from a medicinal injection no movement is desired. Again, the apparatus for sending in the fluid ought not to be a "family" or ordinary syringe, but a fountain syringe, the pressure being hydrostatic. This may be dispensed with if the injection be small and only intended for the lower part of the rectum, but it is indispensable if the injection be intended to reach the upper part of the colon. The entrance of the liquid should always be gradual and easy. If resistance is met with, the pressure must be overcome, not by force, but by waiting a moment until it passes off. When the entire colon is to be flooded, at least a gallon of warm liquid may be needed. In these cases those drugs which are capable of absorption and the production of poisonous symptoms are not to be used except in small amounts. (See Enteroclysis, Part III.)

Where the injection is to reach high up into the bowel the patient should be put in the lithotomy position with the buttocks elevated.

Sometimes in dysentery the injection of a pint to a quart of ice-cold water has a most favorable effect upon bloody purging.

Whenever a medicated injection is to be used for the cure of ulcers which cause hemorrhage, the entire tract which is to be invaded should be washed out with pure water or with a saline or soapy liquid, in order to dislodge mucus and fæces, which prevent the drugs from acting on the bowel-wall.

Hematuria is a condition in which blood appears in the urine, and may be divided into two classes—that in which the blood comes from the kidney or bladder, and that in which it comes from the urethra. In the first class the blood is always well mixed with the urine, which is changed in color from its decomposition, and appears either through the entire act of urination or just at the end of the act. In those instances in which the blood is in the first part of the stream it arises in the urethra, is nearly pure, and not well mixed with the urine.

If the blood is due to the presence of an acute nephritis, the kidneys need treatment, and for directions as to this point the article on Acute Nephritis should be read; while, if the hemorrhage is due to the presence of a lesion in the bladder, the directions governing the use of turpentine, erigeron, or ergot, as given for Menorrhagia and Metrorrhagia, should be followed, or if any morbid growth be present it should be removed. Sometimes 10 to 20 grains (0.65–1.3) of camphor in divided doses are of service, given in pill form, while in others cannabis indica is of value.

Gallic acid, in 20-grain (1.3) doses, may be used, and is very valuable. If the hemorrhage is alarming, injections of astringent washes, such as 2 or 3 grains of alum to the ounce of water, should be injected into the bladder. It must be remembered, however, that this simply fills the bladder with clots, which are not readily passed and are liable to become septic.

A very useful prescription is—

℞.—Acid. gallic. . . . . ʒj (4.0).
Acid. sulphuric. dil. . . . . fʒij (8.0).
Aquæ . . . . q. s. ad f℥iij (96.0).—M.
S.—Teaspoonful (4.0) in water every four hours.

If the hematuria be malarial, quinine has been employed, but in a large number of cases it makes the hematuria worse; and in the Southern United States, where severe malarial poisoning is often seen, physicians ought never to use the drug for malarial hematuria. The value of quinine consists in its ability to prevent further attacks rather than to relieve the result of the attack—namely, the hematuria. Hyposulphite of sodium is a most useful remedy in malarial hematuria in the dose of 5 to 15 grains (0.3–1.0) every five hours. Some practitioners use as much as a drachm of hyposulphite of sodium every two hours till purgation takes place, give morphine and atropine hypodermically to relieve pain and quiet the stomach, apply cups over the kidneys, and give water to drink so as to freely flush the kidneys.

Post-partum hemorrhage is to be controlled by the use of friction and kneading or grasping the dilated uterus through the relaxed abdominal wall; by the use of drachm doses of the fluid extract of ergot or a wineglassful of the wine of ergot; and by the irritation of the uterine wall by passing the hand, which must be absolutely aseptic, up through the vagina into the uterine cavity. Sometimes ice may be passed up the vagina and into the uterine cavity with success in stopping the bleeding, and even vinegar and lemon-juice may be tried if the case is a desperate one. In other cases injections of water as hot as can be borne may be resorted to.

HEMORRHOIDS.

Hemorrhoids are vascular dilatations of capillaries, arteries, or venules situated outside or inside of the sphincter ani, or are composed, in the case of what are called external piles, of tags of skin which are more or less vascular and become troublesome when inflamed.

The internal pile, if large, is apt to prolapse and to become strangulated by the sphincter muscle. It is covered by mucous membrane, and is sometimes very small or like a mulberry in shape, consisting of a tuft of capillaries, a loop of an arteriole, or of a venule. The capillary or arterial hemorrhoid is apt to be bright red, and to bleed profusely when touched or when scraped by hard fæces. The venous tuft also bleeds, but not so freely, and the blood is not so bright in color. In cases in which the hemorrhoids "come down"—that is, pass out through the anus, so being in danger of becoming strangulated—the protruding mass should be washed with cold water, thereby at once cleansing the mass and reducing its congestion, and then gently pushed back with the fingers, which should be well oiled. Care should be taken that an external hemorrhoid is not mistaken for an internal pile, since if an external growth is pushed through the sphincter, it also becomes strangulated.

The treatment of internal hemorrhoids is to a great extent identical with that of the external variety. A suppository may be used, made up as follows, if there is a tendency to slight hemorrhage:

℞.—Acid. gallic.	gr. xx (1.3).
Extract. opii	gr. j (0.05).
Extract. belladonnæ	gr. ij (0.1).
Ol. theobromæ	q. s.—M.

Ft. in suppos. No. x.

S.—Use one every night, or distilled witch-hazel extract may be injected into the rectum.

If the hemorrhage is profuse, the physician should use a speculum, find the bleeding point, and touch it with strong nitric acid, followed by the suppository named above. If this is done, the bowels should be confined for some days, until the spot under the slough made by the acid can heal. If the prolapsed hemorrhoid is inflamed and difficult of reduction, the following ointment of Mathews may be ordered:

℞.—Cocain. hydrochlor.	gr. xij (0.8).
Iodoformi	ʒj (4.0).
Extract. opii	gr. xxx (2.0).
Petrolati	℥j (32.0).—M.

S.—Use as a salve.

If the pile still refuses to be reduced, place the patient in bed and apply hot poultices, and if this fails operation is demanded.

The treatment of external piles themselves consists in the maintenance of the most rigid cleanliness. Immediately after each movement the parts should be thoroughly washed by means of a sponge dipped in cold water, or better still, by the use of the bidet or a nozzle attached to a fountain syringe or to the general water-supply. After they are thoroughly cleansed, it is well to bathe them with distilled extract of hamamelis. Often it is well to precede the regular morning evacuation by a cold rectal injection of pure water to soften the fæces, but more important still to decrease congestion. If the inflammation of the external piles is very acute and profound, the patient should be placed in bed and the cold injections frequently repeated or hot poultices applied to the anus. After the acute stage is passed a lotion of lead-water and laudanum (laudanum f℥ss to dilute lead-water f℥ij) may be used.

The injection of carbolic acid into hemorrhoids is a dangerous practice, but if employed only 1 drop is to be used.

In addition to these applications there are important general rules to be observed.

The patient's habits should be so arranged that his daily act of defecation is at night before going to bed, rather than in the morning, as under these circumstances the rest in bed relieves congestion and soreness, which the maintenance of the erect posture might make worse. Plethoric persons should not use upholstered chairs for office or lounging purposes, as the heat of the body relaxes the rectal tissues. A cane-seated chair is best, or an air-cushion with a hollow centre. The liver plays a most important part in relation to hemorrhoids, and, if it is congested, congestion of the hemorrhoidal veins is very apt to ensue. The connection between the liver and the hemorrhoidal plexus is most intimate, since the plexus is formed by the superior hemorrhoidal veins, which are branches of the inferior mesenteric, and the middle and inferior hemorrhoidal veins, which terminate in the internal iliac. The portal venous system is composed in part of the inferior mesenteric vein, and any obstruction to venous flow in the liver at once results in engorgement of the hemorrhoidal plexus.

(For the surgical treatment of piles reference must be made to surgical works.)

HEADACHE.

(*For Neuralgic Headaches*, see NEURALGIA; *for Bilious Headache*, see BILIOUSNESS.)

Probably no single source of pain compares in its frequency to headache, chiefly because it is essentially a symptom of many diseased processes or functional disturbances, and nothing more. It may arise from eye-strain, from brain disease, from anæmia, from uræmia, from plethora, from nervous breakdown, and from a multitude of causes which, if they were all recounted, would cover many pages of this book.[1] The only forms of headache which will be considered here are those due to congestion or those which arise from fatigue.

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[1] See article on Headache in the author's *Practical Diagnosis*, Lea Brothers & Co.

Congestive headaches, dependent upon an engorgement of the cerebral vessels with blood, are to be treated in a number of ways, and if any direct cause of congestion can be discovered, this must, of course, be removed. So far as the direct application of drugs is concerned, we find two methods of promoting a cure. The first consists in the use of ergot, which will cause contraction of the dilated vessels; the second, in the employment of vascular sedatives, which will produce arterial depression and so remove congestion. Sometimes one of these methods will succeed where the other fails, and it is almost impossible to tell beforehand which case should have one drug and which another. It is to be remembered that when the congestion is due to vascular relaxation and weakness the vascular sedatives are contraindicated.

The use of a hot mustard foot-bath is of great value, and a mustard plaster or dry cup applied to the nape of the neck is often of service in congestive headaches, while in severe cases an ice-bag applied to the head or leeching behind the ears or on the temples may be resorted to. Bleeding often gives relief at once in severe congestive headache.

Where headache depends upon fatigue, either general or local, stimulating treatment is necessary. If eye-strain be the cause, full doses of strychnine or nux vomica are of service, but these remedies cannot be used if there is much retinal irritability. In many instances a combination of caffeine, bromide of potassium, and antipyrin is very successful, as follows:

℞.—Caffeinæ citratis . . . . gr. xl (2.65).
Potassii bromidi . . . . ʒiv (16.0).
Antipyrini . . . . ʒij (8.0).—M.
Ft. in chart. No. xx.
S.—One powder in water as needed.

Sometimes the caffeine makes the headache more acute, and if this occurs only the antipyrin and bromide can be used. (See articles on Antipyrin, Acetanilid, and Phenacetin.)

Another useful prescription is—

℞.—Extract. guaranæ . . . . gr. x vel xx (0.65–1.3).
Ext. apii graveol. . . . . gr. x (0.65).—M.
Ft. in capsul. vel chart. vel pil. No. x.
S.—One every half hour till relieved or three are taken.

Sleep is generally a more useful prescription than any drug, and if city life creates so much mental anxiety during the day as to be wearing upon the nervous system or make the patient wakeful at night, business must be put aside and health and recreation sought at a watering-place. Horseback exercise is very useful indeed, and should be resorted to by all who can afford it if they are sufferers from nervous headaches.

A form of headache which is often very severe, sometimes fleeting, sometimes persistent, is that due to gout, and it is to be treated by means quite distinct from those named so far. Some practitioners of wide experience employ salicylic acid in doses of from 5 to 15 grains (0.3–1.0), while others rely on the iodide or acetate of potassium. In cases where anæmia is present Peabody uses the following prescription, which is compatible, whereas most of the preparations of iron and salicylic acid are incompatible:

℞.—Acid. salicylic.	gr. xx (1.3).
Ferri pyrophosphat.	gr. v (0.3).
Sodii phosphatis	gr. j (0.05).
Aquæ dest.	f℥ss (16.0).—M.

S.—This is to be taken every three hours.

Cohen has used the following, which is more pleasant to the taste:

℞.—Sodii salicylatis	ʒiv (16.0).
Glycerini	f℥ij (64.0).
Ol. gaultheriæ	♏xx (1.3).
Tr. ferri chloridi	fʒiv (16.0).
Acid. citrici	gr. x (0.65).
Liq. ammonii citratis, B. P.[1]	q. s. ad f℥iv (128.0).—M.

S.—Dessertspoonful (8.0) in water twice, thrice, or four times a day.

Other cases of a gouty headache require colchicum, particularly if the gout be widely distributed in its manifestations, and to these Hamilton gives—

℞.—Vini colchici seminis	f℥ss (16.0).
Potassii acetatis Potassii iodidi Tr. cimicifugæ racemosæ	āā fʒv (20.0).
Aquæ	q. s. ad f℥iv (128.0).—M.

S.—Teaspoonful (4.0) every four hours.

HEART DISEASE.

(*For Treatment of* Angina Pectoris see p. 451.)

The writer classifies all forms of heart disease under this heading advisedly. In valvular disease the profession are beginning to understand more and more that the mere destruction or laming of this valve or that has little to do with the treatment, although the ultimate result of the case is somewhat dependent upon these conditions. It matters not whether the leak in a valve be minute or great, provided the heart can still do its work; the condition of the cardiac muscle is the important factor to be considered. If an *irreparable* leak exists in a pump which cannot be stopped for repairs, the question is not, Can we cure that leak? but rather whether we can work the pump with enough force and rapidity to obtain all the water needed for the maintenance of life. Some physicians use heart tonics, such as digitalis, whenever they find a valve diseased, as if to mend the broken valve. Nothing can be more erroneous, for a valve once injured is never regenerated.

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[1] Liquor ammonii citratis, B. P., is made by adding 5 fluidounces (imperial meas.) of strong solution of citrate of ammonium to 15 fluidounces (imperial meas.) of distilled water. The stronger solution of citrate of ammonium is made by taking 12 ounces (avoirdupois) of citric acid, strong solution of ammonia 11 fluidounces, and adding enough distilled water to make 24 fluidounces (imperial meas.).

It should be an invariable rule with every physician in examining a patient with heart disease to determine whether or not the tissues of the body receive their normal blood-supply. If they do not, even though the leak is so small as almost to escape notice, treatment is to be instituted; but, on the other hand, if the murmur heard on auscultation is as loud as that of a machine-shop and the tissues are not starved, no remedy is needed.

Another very important point in regard to the treatment of cardiac disease in children in the remembrance that the stunting of the body and the slowness of growth are not merely the result of heart trouble, whereby the tissues do not increase in size from lack of nourishment, but occur for a special purpose. Let us suppose that a child of eight or nine years has scarlet fever or rheumatism, which leaves the cardiac valves impaired in function for a few days, or hours at least, the question must arise in the heart: "Can I properly fill all the blood-vessels?" If the heart can supply the vessels, the child lives, but is stunted, because Nature is wise enough to understand that the struggling heart has all it can do to supply even a stunted frame, and realizes that a rapidly increasing area of blood-vessel surface in a growing child would exhaust the cardiac muscle.

The physician should not permit the parents to worry over this lack of growth, but by the use of gentle gymnastics or tonics, and attention to the care of the general health, he is enabled to improve the cardiac condition. As soon as this organ is strong enough to permit of growth, growth will take place.

In the general treatment of heart disease in persons who have until recently had no signs of heart failure the most important thing for the physician to prescribe is rest. A tired heart cannot supply an active body.

Having made these preliminary remarks, let us turn to the direct application of drugs to heart disease, the chief drug in the list being, of course, digitalis.

The value of digitalis may be said to rest upon a number of influences possessed by it. In the first place, evidence is constantly accumulating to show that digitalis increases the nutrition of the heart-muscle by the stimulating influence which it exerts on the pneumogastric nerve, this nerve having been partly proved to be a trophic nerve of the heart. Aside from any such nervous influence, the heart-muscle receives a greater blood-supply under the use of digitalis, since both diastole and systole are influenced by the drug, the systole being more complete and the diastole being prolonged and more extensive.

Two theories concerning the nutrition of the heart-muscle through its blood-supply have been promulgated. One is, that the coronary arteries are filled with arterial blood as the heart drives its contents out of the left ventricle into the aorta, or, in other words, during systole.

The other hypothesis rests upon the belief that the contracting muscle prevents a free circulation of blood through the cardiac blood-vessels, and that the blood is driven into the coronary arteries during diastole by the pressure in the aorta, the aortic valves being closed. In the belief of the author both of these theories are partly true. That is to say, the coronary arteries are filled during ventricular systole, according to the first theory, but the complete passage of the blood through the smaller vessels of the cardiac muscle only takes place as relaxation or diastole occurs. The ground for this belief consists in the observation that a muscle when firmly contracted always presses upon its supplying blood-vessels, and particularly interferes with capillary flow. The heart of one of the lower animals, if carefully watched after the chest-wall is removed, will always be found to become paler during systole and redder during diastole, and if wounded will bleed more freely during the relaxing period than during the contraction of its fibres. As the blood everywhere in the body nourishes the tissues, not when in the arteries, but while passing through the capillaries, it would seem self-evident that, while the coronary arteries are filled by the systole or contraction of the heart, the nutritive changes and perfect capillary circulation go on during diastole. If these things are true, the increase in cardiac nutrition and growth under the action of digitalis is only what one would expect, for we have learned when studying this drug that it prolongs diastole and increases the force and volume of the systolic wave of blood. In other words, digitalis fills the coronary arteries almost to bursting, and so, when diastole occurs, not only floods the cardiac capillaries with blood, but prolongs the period during which the interchange between the blood-stream and tissues takes place.

There is still another way in which digitalis does good in cardiac disease by reason of its peculiar powers. Normally, the heart beats fast or slow according to the demands for blood made upon it by the system, and its action is varied by the calls which it receives from the tissues. In heart disease, with failure of compensation owing to the leaky valves, the tissues are starved, and continually send messages for more nourishment to the cardiac muscle, which finally becomes exhausted by its endeavors to supply their wants, and beats now fast and now slow, uncertain what to do. If digitalis is given, the vagi render the cardiac action regular and effective, acting as regulators and directors of its energies, thereby supplying the tissues and using the remaining power of the heart to the greatest advantage, in addition to improving its blood-supply by the methods already described. The starving tissues of the body having been satisfied, as Wood has eloquently expressed it, "the angry messengers from the periphery cease their callings, and the heart is at peace and in comfort."

From what has been said it becomes evident that this drug, digitalis, does good whenever the heart is weak or unable to supply the body with blood, and we find for this reason that cardiac dilatation, simple cardiac failure, or heart failure dependent upon the presence of poisons all indicate its use.

The mechanism of the action of digitalis in the different cardiac valvular lesions still remains to be described, and before doing so the author desires to remind the reader that a patient under the full influence of digitalis ought to maintain the recumbent posture. (See article on Digitalis.) Further, the drug tends to accumulate, and therefore it should be stopped for several days at the end of each week of its use.

Taking up the most common condition, that of mitral regurgitation, we find that in this disease the blood passes, in its normal flow, from the auricle into the ventricle, and, when the ventricle is filled, that the cardiac muscle contracts on all sides equally. Normally, the mitral valves close the auriculo-ventricular opening and prevent any of the blood from regurgitating back into the auricle, and the greater the pressure the tighter they become. Abnormally, the blood is still pressed upon on all sides as before, and, trying to escape, as do all liquids, from pressure, finds that, owing to disease of these valves, it can, in part at least, slip back into the auricle from which it came, rather than pass out into the high pressure of the arterial system. The ventricle, therefore, propels blood in two directions—in the wrong way and in the right way. If the leak is large enough to permit of the regurgitation of a large part of the blood, then death occurs. Digitalis does good in mitral regurgitation, because, by increasing the force of the ventricle, it increases the friction at both the mitral leak and the aortic opening; but, as the aortic opening is a large one and the mitral leak a small one, the greater quantity of blood passes out into the circulation. The same fact arises for consideration as before—namely, that it is not the amount of leak, but the amount of supply to take its place, which is the vital question in the case. Sometimes relief does not occur, and the patient is made worse by digitalis, because the leak is increased as much as the normal flow.

In mitral obstruction the difficulty is that the blood cannot enter the ventricle with sufficient rapidity, and this part of the heart contracts *before* it is well filled. By the prolongation of diastole the blood is given sufficient time to enter and the ventricle is filled, sending out into the system a large wave of blood when it contracts. Further than this, the stimulation of the right ventricle by the digitalis enables this part of the heart to overcome the tendency to congestion which arises from the obstruction on the left side of the heart.

In aortic stenosis there is obstruction to the normal flow of blood out of the heart, and the digitalis is needed to increase the ventricular force, so that it may overcome the difficulty.

In aortic regurgitation digitalis, by its stimulation of the heart, may cause a sufficient output of force to clear itself of the regurgitant flow, but in many cases the drug fails, because the prolongation of diastole gives so much more time for the blood to flow backward into the dilating ventricle. The cardiac remedies to be used in such cases are strophanthus, in the form of the tincture, dose 3 to 5 drops (0.15–0.3), adonidin, dose $\frac{1}{5}$ to $\frac{1}{2}$ grain (0.013–0.025), and sparteine $\frac{1}{2}$ grain (0.025). These remedies may also be used in the other forms of cardiac disease where digitalis fails. It is important to remember, however, that some cases of aortic regurgitation do improve, at least temporarily, under digitalis.

Physicians often meet with cases of severe cardiac disease in which there are present a laboring heart, distended jugulars, and cyanosis, indicating engorgement of the right ventricle. This is to be relieved by free venesection from the arm, and, after the engorgement is removed, by the use of digitalis.

In many cases of cardiac disease there is associated with the heart lesion general debility and anæmia. These cases should be treated not only by the use of heart tonics, but also by iron, arsenic, simple bitters, and, if constipation is present, by mild purgatives.

In cardiac dropsy digitalis and the other heart stimulants do good by raising blood-pressure and pulse-force, and in some instances by stimulating the kidneys to increased efforts at elimination. (See Dropsy.) In these cases, too, the patient will often be greatly benefitted if he receive every few days a dose of one of the hydragogue cathartics, which will relieve his dropsy and unload the portal circulation.

On the other hand, if the heart is feeble and the arterial tension is high, we not only have to give nitroglycerin to relax the spasm, but it is best to employ a cardiac tonic which at the same time that it stimulates the heart will not raise arterial pressure, as, for example, strophanthus, in preference to digitalis, which stimulates the arterial system and increases the tension.

In sudden cardiac failure from weakness or poisons the use of ether and ammonia is to be resorted to at once, and these are to be followed by alcohol and digitalis if necessary. The ammonia is a direct heart-stimulant, as are also the alcohol and ether.

In cardiac palpitation dependent upon indigestion this condition must be relieved by appropriate digestive remedies; but in that form of palpitation due to over-exertion or heart-strain digitalis is useful. Iron is to be used if the irritability is due to anæmia. Tea, coffee, tobacco, and excessive venery are to be forbidden. Sometimes nux vomica does good by stimulating the heart and nervous system, and belladonna seems of great value where arhythmia is present. In other cases of arhythmia the patient will be more benefited by the use of cactus grandiflorus and sparteine, and sometimes a prescription of aconite and digitalis, as suggested in the article on Aconite. Ringer recommends the use of veratrine ointment over the præcordium in many of these cases.

In cases of cardiac dilatation and asthenia digitalis is often very useful; but should the patient be advanced in years and have a tendency to arterio-sclerosis we should, simultaneously with its use, give nitroglycerin to relieve any arterial spasm which will resist the action of the heart.

Cardiac hypertrophy is rarely seen without some other lesion accompanying it, but it may occur from prolonged and excessive exercise or other cause. It is to be treated by perfect rest and avoidance of excessive exercise, and by the use of moderate amounts of food of a non-stimulating character. Wines and coffee should be forbidden, and small amounts of veratrine ointment or a belladonna plaster may be placed over the præcordium if the action of the heart is very excessive. Both palpitation of the heart and cardiac hypertrophy are very favorably influenced in many cases by aconite or veratrum viride.

Physicians who are in the habit of seeing young men professionally will constantly have their attention called to a condition of shortness of breath on exertion, palpitation, or violent pulsation of the heart, and in some instances the development of severe symptoms which, at first glance, may seem to be those of true angina pectoris. In many of these youths there will be a history of the excessive use of tobacco, or that they have left college, where they have been indulging in severe athletic exercise, such as running or bicycle-racing, and have gone into business, where they lead a most sedentary life. In these cases the condition which exists is comparable to the condition which exists in a steamer whose engines are too strong for her hull. The heart, which has heretofore been supplying the body of an athlete with blood, now finds itself too strong for the sedentary individual. There is probably no remedy which will give such good results under these circumstances as aconite, given in the dose of 1 minim (0.05) of the fluid extract or 2 to 3 minims (0.1–0.15) of the tincture three times a day, particularly if at the same time a good belladonna plaster about four inches square is applied over the præcordium. Many cases of tobacco heart, in which there is arhythmia, with an excessive cardiac impulse over the præcordium, with palpitation on exertion, will be benefited by aconite used in this way; but where the heart seems much depressed, so that the apex-beat is feeble and the first and second sounds are not clearly heard, aconite will seldom, if ever, do good.

In that form of functional cardiac disorder due to indigestion aconite is not capable of producing the results which are obtained in the cases which we have just mentioned. It may, however, be used as a remedy of value at the same time that the physician is directing his attention to the cause of the trouble—namely, the gastro-intestinal disorder, with the treatment of which this article has nothing to do. Here, again, a condition of cardiac feebleness contraindicates the employment of this drug.

Passing to the employment of aconite in cases of true cardiac disease, we find that a careful study of a certain number of cases will soon show the physician that this drug is capable of doing more good in some instances than is digitalis.

The history of the following case illustrates this point: A man, aged nineteen, was brought to the hospital suffering from aortic obstruction, and as a result of this was attacked with dyspnœa on the slightest exertion, marked cardiac arhythmia, with palpitation, some giddiness, and a tendency to nose-bleed. He stated that in the early part of the year, and for several years preceding it, he had been a deck-hand on a coastwise vessel, where he performed hard manual labor, notwithstanding the condition of cardiac disease which was present, and of which he knew nothing. During this time he suffered from no symptoms indicating cardiac disorder. In other words, compensatory hypertrophy was complete. Because of the exposure incident to the work he was forced, under the advice of a physician, to earn his living on shore. He was unsuccessful in trying to obtain employment, and a prolonged period of muscular inactivity followed. As a consequence of this the cardiac hypertrophy, which had hitherto been compensatory, was now excessive, and he suffered from marked cardiac palpitation, with disordered circulation in the extremities, and from a considerable amount of cough. Very early in the study of the case it was recognized that these disorders were due to the excess of cardiac hypertrophy, and not to failure in compensation, and, as a consequence, that a cardiac depressant was indicated rather than a cardiac stimulant in the shape of digitalis.

He was given from 1 to 2 minims (0.05–0.1) of the fluid extract of aconite three times a day, and during the continuance of this treatment was purposely confined to his bed. At the end of the week so much improvement had taken place in his condition that he was allowed to rise and go about the ward as he wished, and after four weeks, the medicine being continued during this period, he was so well that he was discharged from the hospital, with no other evidence of cardiac disorder than physical examination would show.

When aconite is used, rest in bed is essential, in order that the heart may not be excited to great activity by exercise of the limbs, and also because the recumbent posture allows the physician to use larger doses of the drug.

An exceedingly useful treatment of valvular disease with or without excessive cardiac hypertrophy is rest in bed without medication. The results in some cases are extraordinary.

Fatty heart occurs in two forms—that in which true fatty degeneration has taken place in the muscular fibre, and that in which there is a deposit of fat about the heart and between the fibres. Nothing of any importance can be done for the first state, but much for the second. In neither form is digitalis of much value. If given it should be combined with nux vomica, or nux vomica may be given alone in full doses. The patient suffering from this latter form of heart trouble is nearly always obese, and should abstain from fats and rich foods, from all sweet wines or malt liquors, from sugars and milk, and, at the same time, take exercise. At first this treatment may cause dyspnœa, but by gradually increasing the severity of the exercise great feats can generally be effected in the end, with marked improvement in the cardiac action. (See Obesity.)

HEPATITIS.

(*Acute and Chronic Hepatitis and Hepatic Abscess.*)

Inflammation of the liver may be produced by many causes, such as injuries, cold, exposure to high heat (as in the tropics), syphilis, and the presence of any infectious disease or of parasites. It may also arise from alcoholism. The acute form is rarely directly produced by syphilis unless by the presence of some other form of the disease, such as gumma or the absorption of septic materials into the circulation from wounds or sores. The same may be said of the hepatitis of hot climates, which is generally subacute or chronic. The pain, swelling, and general symptoms of the acute form of inflammation of the liver are described thoroughly in the text-books on the practice of medicine. The measures commonly adopted for the relief of the symptoms and the disease itself are of two kinds: the first, medicinal; the second, dietetic.

The patient, if the attack be acute or severe, will commonly be found in bed, owing to the pain and fever, but if not he must be placed in bed and kept in a recumbent posture. Over the surface of the right hypochondrium should be placed two cantharidal blisters of the diameter of from one to three inches, or, if this is not possible, a large mustard plaster is to be used. Sometimes hot cloths applied over this area not only give relief, but also aid in the formation of the blister. At the same time, if the bowels are greatly confined, a saline purgative may be given, and be preceded by 1 grain (0.05) of calomel given in fractional doses. In regard to internal medication, the physician should recollect that hepatitis is, like every inflammation, a local hyperæmia or vascular engorgement, and, in consequence, that aconite in full doses is useful. Veratrum viride may be used, but as it may produce vomiting and disturb the liver, it should rarely be employed. The kidneys may be kept active by spirit of nitrous ether and citrate of potassium, or by any one of the diuretic waters, such as Vichy, in moderate quantities.

If the inflammation is not aborted by this treatment, it may go on to hepatic abscess.[1] If hepatic abscess develops, the best thing to be done is to aspirate and draw off the pus. Very frequently the inflamed organ will form so strong an attachment with the peritoneal coat of the abdominal cavity that a bistoury may be used to free the pus if an aspirator is not at hand. After pus is once formed any constitutional evidence of its presence, as by night-sweats, hectic, or rigors, is a sign for immediate interference with the purulent collection by the physician. If amœbic dysentery exists, it must be cured as rapidly as possible by the measures generally employed for this purpose. (See Dysentery.)

The diet during the early and later stages of acute hepatitis should be limited to those articles of food which are easily digested and assimilated, and rich or greasy dishes are to be excluded. "Strong foods," as meats of all kinds, particularly beef, pork, and mutton, are to be sedulously avoided. All spices in the food must be forbidden, and alcohol utterly tabooed. If koumyss cannot be had, the patient may be fed on peptonized milk or pancreatized oysters. (See Part III.) After the abscess develops the same recommendations are to be followed, and the diet is to be as supportive as possible, small doses of quinine and iron being used.

In the treatment of the subacute or chronic hepatitis of hot climates no remedy compares to freshly-prepared strong nitromuriatic acid, used both externally and internally. The acid should be a deep lemon color, and be mixed with water only when about to be taken, in the dose of 3 to 4 drops (0.15–0.2) three times a day. This remedy is contraindicated in acute hepatitis, because it acts by stimulating the organ, and would only increase the severity of the acute form of the disease if administered at this time. Externally, it is to be used by mixing it with water and applying it by means of a flannel wrung out in the mixture, or by placing it on spongiopiline in the proportion of from 1 to 3 fluidrachms to the pint (4.0–12.0 : 500 cc.) of warm water and applying it over the liver. If 3 fluidrachms (12.0) irritate the skin too greatly, the smaller quantity should be employed. This application causes a tingling of the skin and a localized sweat.

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[1] Just here it may be well to recall that many cases of hepatic abscess are now known to be due to dysentery, and that the diseased state of the lower bowel may infect the liver.

The hepatitis due to syphilis generally shows itself as a cirrhosis, and is to be treated by antisyphilitic measures. (See Syphilis.)

If ascites develops from cirrhosis, the liquid is to be withdrawn, and frequent aspirations, as often as the liquid returns, have been known to result in apparent cure or arrest of the disease. In all forms of chronic hepatitis iodide of potassium is a useful remedy in the dose of from 5 to 10 grains (0.3–0.65) three times a day, or larger amounts may be used if the disease be due to syphilis.

HICCOUGH.

This is an affection arising from many causes, depending upon irritability of the nerves supplying the diaphragm as a result of gastric irritation, nervousness, uræmia, and as a complication of several exhausting diseases, such, for example, as typhoid fever.

The mechanism of its production rests upon the sudden contraction or descent of the diaphragm, whereby a vacuum is formed in the chest into which the outside air attempts to rush, but is prevented from doing so by a sudden closure of the glottis, the peculiar sound of the hiccough being thus developed. Generally the symptom stops of itself, but it may become continuous and excessive.

The remedies to be employed are used according to the cause of the disorder. If there be gastric or intestinal irritation, the irritating matter must be removed by emetics or purges, and nervous and local sedatives used. A few drops of spirit of chloroform do good in many cases, and a little tincture of capsicum may be employed in other instances, say 2 or 3 drops (0.1–0.15) well diluted. Children should only have ½ to 1 drop (0.025–0.05) of the tincture, well diluted. Spirit of camphor, or the tincture of valerian, in the dose of 1 drachm (4.0), may be serviceable, and Hoffmann's anodyne is peculiarly appropriate in the dose of 1 drachm (4.0) in starch-water. In the hiccough of typhoid fever nothing compares to musk, 10 grains (0.65) by the rectum, and, if this cannot be used, oil of amber may be given by the mouth in the dose of 5 to 10 drops (0.3–0.65) in capsule or emulsion, and followed by a drink of milk to prevent irritation of the stomach. Nitrite of amyl may also be inhaled.

Where external remedies are resorted to, ether thrown in a fine spray on the epigastrium may stop an attack.

In cases where the affection comes on after meals and is due to indigestion, a course of tonic treatment will often give relief. Thus nux vomica in pill or tincture, accompanied by some dilute mineral acid, such as hydrochloric or nitric, may be employed, or

℞.—Sodii bicarb. . . . . ʒj (4.0).
Tinct. nucis vom. . . . . fʒj (4.0).
Tinct. cardamomi . . . . q. s. ad f℥iij (96.0).—M.
S.—Teaspoonful (4.0) before each meal.

If the symptom be uræmic, a hot pack or a hypodermic injection of hydrochlorate of pilocarpine may be found of service, unless contraindicated by advanced depression and systemic weakness.

INCONTINENCE OF URINE.

Incontinence of urine may be classified either according to its forms or the methods of its treatment.

Four varieties may be recognized as occurring separately, although all of them may occur in one case. There are cases where the bladder fails to hold the urine day or night, those in which the incontinence is only nocturnal, and those in which it occurs only upon some nervous start or in which the sphincter becomes relaxed from general atony. The first of these occur in children, the last in adult females. A fourth form of incontinence depends upon paralysis arising from centric nervous disorder or from paralysis due to retention and consequent paralytic distention.

Taking up the consideration of the first forms—namely, those occurring in children, in which the trouble is generally nocturnal—the complete history and the present condition of the case must be discovered. Many of the most obstinate cases will yield when the urine is made constantly clear and mild by the use of alkalies, and others will recover upon the removal of worms from the vagina, which have crawled there from the rectum, or upon circumcision of a redundant prepuce, particularly if this be tight and smegma and urine be found back of it in large or small quantity. The cause of the incontinence in both these conditions is reflex irritation of the bladder-walls, by irritation at the end of the penis or in the vagina, and the reason that alkalies do good is that they render the urine, which is concentrated and irritating, dilute, alkaline, and mild. Belladonna in these cases is rarely, if ever, curative, and is at most only palliative, the condition returning as soon as the passing off of the effects of the drug permits the irritation to be felt by the nerves of the bladder. After alkaline diuretics have been used belladonna is, however, very valuable.

Where the urine is concentrated and dark in color the following prescription is always useful:

℞.—Potassii citratis . . . . ℥ss (16.0).
Spt. ætheris nitrosi . . . . fʒvj (24.0).
Aquæ . . . . q. s. ad f℥j (32.0).—M.
S.—Dessertspoonful (8.0) every four hours in equal quantity of water.

As the urine becomes clear after several days a few drops of tincture of belladonna may be added to the mixture; but if a little is not sufficient, it must not be increased, as belladonna will not cure the condition, and may make the urine concentrated—a condition directly opposed to that which is wanted.

Sometimes these cases are dependent not so much upon vesical irritability as upon weakness of the spinal centres governing the bladder. If this be the case, the urine should first be rendered mild and then remedies should be directed to the improvement of these parts. The following pill or the succeeding solution should be administered:

℞.—Acid. arsenosi . . . . gr ⅓ (0.02).
Extract. nucis vomicæ . . . . gr. ij (0.1).—M.
Ft. in pil. No. xx.
S.—One three times daily after meals for a child of eight or ten years.

Or,

℞.—Liquor potassii arsenitis . . . . gtt. xxiv (1.6).
Tinct. nucis vomicæ . . . . gtt. xvj (1.0).
Aquæ . . . . q. s. ad f℥iij (96.0).—M.
S.—Teaspoonful (4.0) three times daily after meals for a child of eight or ten years.

This mixture is so bitter as to be exceedingly disagreeable, and Fowler's solution may often be used alone in the dose of ½ to 1 drop (0.025–0.05), and at the same time strychnine in gelatin- or sugar-coated pill or granule.

It must be remembered that this last treatment is only to be employed in chronic cases devoid of all irritation and dependent upon atony. It will not do good if the urine is not previously made clear.

Nothing can be more unfortunate in the treatment of these cases than punishment by severe scolding or whipping the child, as they never do good, and, the fault being beyond the child's control, the unjust punishment makes him sullen, or through nervousness, augmented by such treatment, his trouble becomes worse. In some cases it may be necessary, in order to cure the habit, to let the child drink diuretic waters for years. The patient should always be taken up from bed when the parents retire for the night and made to evacuate the bladder.

For the incontinence of adult females or males on laughing or sudden movement nothing compares, from a curative point of view, to drop doses of tincture of cantharides three times a day, the urine being kept flowing freely from the kidneys by means of alkaline diuretics.

The treatment of the fourth form of incontinence of urine comes into the province of surgery. The bladder must be relieved by the catheter if the trouble be from retention with distention. If the disorder is due to paralysis, nothing can be done except to carry out those general measures valuable in such cases—to maintain the urine in as normal a state as possible, to frequently catheterize with an aseptic catheter, and to wash out the bladder every few days or hours, as the case may be, with some weak antiseptic fluid, such as the 1 : 10,000 solution of bichloride of mercury, or 1 : 100 of carbolic acid, or 1 : 100 of boric acid.

INDIGESTION (GASTRIC AND INTESTINAL).

Under the heading "Biliousness" the writer has already described many of the conditions arising out of indigestion, and, this being the case, the consideration of that state known as dyspepsia or indigestion will only receive attention at this point in so far as its cure is concerned, without the relief of the symptoms produced.

Lack of *gastric* digestion depends for its existence upon a very great number of causes, and is always a symptom, not a disease. It occurs during the course of short or prolonged fevers from atony of the gastric walls and glands, from lack of secretion of the proper character, from hypersecretion of mucus by the mucous glands, and by fermentative changes in the food, or as the result of any one or all of these conditions, and, lastly, because the food is unsuitable to the case, or is of a kind difficult of assimilation, or is readily split up into effete products by the juices of the organ, and these in turn, being absorbed, produce toxic symptoms. Sometimes it is due to organic changes in the abdominal viscera, as carcinoma or ulcer, and sometimes to acute or chronic gastritis. In each of these states the treatment is, of course, different, because widely-separated causative factors must be removed.

The indigestion attendant upon the course of fevers can nearly always be avoided by a proper diet and the use of predigested food, such as pancreatized beef-tea, milk, or broths. The necessity of this artificial digestion is the more readily recognized when we recall the investigations of Hoppe-Seyler upon the quality of the gastric juice of a patient suffering from typhus fever, for he found that no hydrochloric acid was present. Uffelmann has also found in a similar study that the peptone-forming secretion of the stomach ceases entirely during fever.

Where indigestion results from the presence of gastric catarrh the remedies applicable to such a state must be resorted to. (See Gastric Catarrh.)

The studies made within recent years upon the chemical conditions of the gastric contents have changed our methods of treatment from being empirical to being rational, for we now know that disorders of digestion depend on deficient or excessive acidity of the gastric juice, deficient formation of pepsin, deficient motility of the gastric walls, and other less important causes. Before carrying out any line of treatment the physician must therefore decide, if possible, as to the underlying cause of the dyspepsia found in each case, and his decision may be based on well-described subjective symptoms by the patient, or upon this description aided, or it may be replaced, by examination of the stomach contents after a "test-meal."

In those cases in which the dyspeptic symptoms result from imperfect mastication and insalivation of food it is evident that careful eating rules are to be given the patient, with the additional advice, which is equally good in all cases, that exact meal-hours shall be adhered to, since irregularity in meal-hours results in imperfect digestion as commonly as irregularity of habit in regard to defecation results in constipation. If the dyspeptic symptoms are due to deficient secretion of gastric juice, particularly if it is found that hydrochloric acid is the chief deficient element, one of two plans presents itself for employment. In many cases it will be found that the administration of small doses of bicarbonate of sodium, 5 to 10 grains (0.3–0.65), before each meal will cause a free secretion of gastric juice, particularly if it be given simultaneously with bitter substances which act as stimulants to the gastric mucosa. These facts are not based solely on the apparent improvement in the patient, but also upon careful chemical studies of the acidity of the gastric juice by means of the stomach-tube. In mild cases the taking of a glass of Vichy water before each meal serves to provide sufficient sodium to produce good effects. The bitter substances which it is best to employ in cases of deficient acidity of the gastric juice are, among the simple bitters, such drugs as quassia, cascarilla, colombo, and gentian. Among the peculiar bitters we have nux vomica, quinine, rhubarb, and condurango. These may be employed in the following forms:

℞.—Sodii bicarbonatis . . . . ʒj (4.0).
Tinct. nucis vomicæ . . . . fʒj vel. ij (4.0 vel 8.0).
Tinct. gentian. comp. . . q. s. ad f℥iij (96.0).—M.
S.—Teaspoonful to a desertspoonful (4.0 to 8.0) before meals.

If the stomach is lazy and atonic, but with no true disease which impairs its secreting power, an alkali will, in the majority of cases, prove to be the best drug; but if, on the other hand, there is deficient gastric secretion through atrophy of the gastric tubules or carcinoma of the stomach, the use of hydrochloric acid is the better plan. Under these circumstances the following prescription may be ordered:

℞.—Acid. hydrochloric. dil. . . . . fʒj (4.0).
Ext. condurango fl. . . . . f℥j (32.0).
Tinc. cardamomi comp. . . . . . . q. s. ad f℥iij (96.0).—M.
S.—Dessertspoonful with or after each meal in water.

The symptoms manifested by persons needing the treatment first named are variable, but generally of sufficient constancy in type to be fairly pathognomonic. There is generally loss of appetite, some impairment in general health and nutrition, and marked difficulty in digesting food, particularly if it be in solid form. Complaint is usually made of a sensation of weight after eating, without any real pain, but indigestion is not complete, owing to the food being finally disposed of in the duodenum. Often because of the delay in gastric digestion there is some belching of gas due to fermentation of the food in the presence of warmth and moisture, and without the antiseptic influence of the gastric juice. If any food is brought up with the belching, it is unaltered or changed only by fermentation. Examination of the stomach-contents for hydrochloric acid by the phloroglucin-vanillin test will speedily confirm the diagnosis of absence of hydrochloric acid, and this confirmation should be sought for in every case.

In the cases of gastric indigestion depending upon hypersecretion of the acid of the juice a line of treatment quite at variance with that just discussed must be instituted. This may be divided into the direct and indirect forms, including the remedies which distinctly decrease gastric secretion and those which antagonize or overcome its acidity after it is poured out from the glands. In the first-class we find both general and local nervous and glanular sedatives, and in the second alkaline drugs.

Of the first class we have hyoscyamus, belladonna, and opium from the vegetable kingdom, and the bromides, bismuth, and nitrate of silver from the mineral. Of the second class we have massive doses of sodium bicarbonate taken during or after meals, ammonia, generally in the form of the aromatic spirit, and magnesia and chalk.

As many, if not all, of the cases suffering from hyperacidity are of a nervous temperament, these drugs do good by quieting reflex activity throughout the nervous system connected with digestion, and by a local action on peripheral nerves, or on the glands themselves, diminish secretion. Of particular value for this purpose is hyoscyamus, which very markedly decreases gastric secretion directly and indirectly, and at the same time relieves gastric pain by its local sedative influence.

Taking gastric ulcer as a typical instance of a condition of excessive secretion of hydrochloric acid, it will be found that the following pill, combined with an absolute milk diet or, for the first few days, allowing only rectal alimentation by peptonized food, will be most useful:

℞.—Argenti nitratis . . . . gr. v (0.3).
Extract hyoscyami . . . . gr. x (0.65).—M.
Ft. in pil. No. xx.
S.—One pill one hour before taking food.

Sometimes in place of this pill it is wise, particularly if no ulcer exists, to give 10 to 20 grains (0.65–1.5) of bromide of strontium one hour before meals, and in any case where this fails to control excessive secretion of acid full doses of sodium bicarbonate may be given, 20 or 30 grains (1.5 or 2.0) or more, after each meal. The bromide had better be given in solution. If the stomach is very irritable and there is a tendency to vomiting, a powder composed as follows is often useful:

℞.—Acid. carbolic. (cryst.) . . . . ♏ xx (1.5).
Bismuthi subnitrat. . . . . gr. cc. (14.0).—M.
Ft. in chart. No. xx.
S.—One t. i. d. with or before food.

The symptoms manifested by the patients requiring this treatment are as follows: There is often a constant sense of gnawing or hollowness in the stomach, which is sometimes temporarily allayed by the taking of food. The patient is, as a rule, of a nervous temperament and in a condition of nervous depression due to some exhausting cause. Tenderness and even pain in the epigastrium may be produced by superficial or deep palpation, or the patient may complain that the pressure of his clothes is distressing. If ulcer of the stomach is present, all the characteristic symptoms of that lesion may be found. When belching occurs, there is often vomiting of sour masses or acid eructations or heartburn. Gastralgia more or less severe may also occur.

In cases where testing the stomach-contents shows that the excessive acidity is not due to hydrochloric acid, but to the acids of fermentation, the use of the sedative drugs we have named is of no avail for obvious reasons, but in their place we may employ sodium bicarbonate as a palliative, and antiseptic or antifermentative drugs, such as thymol, creosote, chloral, and sodium hyposulphite, as direct remedial agents. Lavage of the stomach should also be resorted to.

In still other cases a mixture containing chloral and hyposulphite of sodium is useful because of its antiseptic influence. (See Chloral.)

Often these cases are relieved if all fats, and butter in particular, are excluded from their diet-list.

If much gas is developed and a sensation of weight in the stomach is felt after eating, so that the patient feels as if the food lay undigested in that organ, the following prescription may be used, but is contraindicated if the stomach is tender on deep palpation, or, in other words, if acute irritation or inflammation of the stomach is present. It is useful in atonic states of the stomach, and it is surprising how much relief may be afforded by the use in such cases either of this prescription or of one of the volatile oils, such as oil of cinnamon, given in capsule or pill after meals.

℞.—Oleoresin. capsici	♏ij (0.1).
Pepsin. vel pancreatin.	gr. xx (1.35).
Pulv. zingiberis	gr. xx (1.35).
Carbo ligni	gr. xl (2.65).
Creosoti	♏x (0.65).—M.

Ft. in pil. No. xx.
S.—One after eating.

Intestinal indigestion depends upon almost the same causes as does gastric dyspepsia, and is to be treated in much the same manner, chiefly by a careful study and regulation of the patient's diet, and by the use of a number of remedies calculated to supplant to some extent the normal juices by some artificial ferment. These ferments should be given with the meals or the food predigested before it is taken.

The pancreatin should be given in full dose (5 to 10 grains [0.3–0.65]), with bicarbonate of sodium, and alkaline mineral waters used if the urine is concentrated. (See Biliousness.)

Sometimes where intestinal indigestion is present great flatulence comes on, and is an annoying symptom. Very commonly in these cases it will be found that the patients think they have heart disease because of the pain they suffer under the præcordium. This pain is due to the accumulation of flatus in the small intestine, or more commonly to its pressing upward at the angle where the transverse colon turns to go down to form the descending colon and sigmoid flexure. Under these circumstances the following prescription will be found of service:

℞.—Acid. nitric. dil. . . . . fʒj (4.0).
Tinct. cardamom. comp. . . . . f℥vj (192.0).—M.
S.—Dessertspoonful (8.0) in water four times a day.

In old persons flatulence of the large bowel is frequently found, and is often associated with atony of the muscular coats of the gut. Under these circumstances the following prescriptions will be found of service:

℞.—Asafœtidæ . . . . gr. xl (2.6).
Extract. nucis vomicæ . . . . gr. iv (0.25).
Extract. physostigmatis . . . . gr. iij (0.18).
Oleoresin. capsici . . . . ♏x (0.65).—M.
Ft. in pil. No. xx.
S.—One pill three times a day, two hours after meals.

Or,

℞.—Tinct. belladonnæ . . . . fʒij (8.0).
Tinct. physostigmatis . . . . fʒj (4.0).
Spt. camphoræ . . . . q. s. ad f℥iij (96.0).—M.
S.—Teaspoonful (4.0) two hours after meals or whenever needed.

Where intestinal indigestion results in lientery the treatment becomes entirely changed, except in regard to the use of a predigested milk diet, and efforts must be made to increase the secretion of the glands of the intestinal wall. Often minute doses of mercury bichloride or podophyllin may do this, $\frac{1}{60}$ to $\frac{1}{40}$ grain (0.001–0.0016) of the first or second, respectively. More commonly, however, the mixture of nitric acid, given above, will be the proper treatment, or perhaps the following if the liver is found to be torpid:

℞.—Acid. nitro-hydrochlor. (not dil.) . . . fʒss vel fʒj (2.0–4.0).
Infus. gentianæ comp. . . . . . . q. s. ad f℥vj (192.0).—M.
S.—Dessertspoonful (8.0) every four hours or after meals, in water.

Chloroform spirit is often valuable in these cases in the dose of 20 drops (1.3). (See Chloroform.)

INFLUENZA.

The disease known as influenza affects various individuals so differently, and presents so many symptoms associated with functional disorder of various organs in the body, that it is almost impossible to do more than consider the remedies which are to be employed in the treatment of the more frequent or more immediate manifestations or complications. Greater in importance than the employment of drugs must be regarded continuous rest, and stimulants are in many cases absolutely essential.

In those cases in which the disease is ushered in by a severe chill, accompanied by violent pains in the back, if the patient is seen early enough it may be necessary to employ remedies for the relief of the rigor, with the double purpose of improving the patient's general condition and preventing internal congestion of vital organs. In the majority of instances, however, the patient will not be seen during this period of the disease, but during the febrile stage, which succeeds that just mentioned. Under these circumstances the author does not believe that it is well for the physician to resort to any of the remedies which have been so largely used during the last few years, and which are known as the "antipyretics" or the derivatives of coal-tar. Although originally introduced for the purpose of reducing febrile temperatures, practical experience has taught us that their sphere of action is very limited under these circumstances, and the author almost never gives antipyrin, phenacetin, or acetanilid with the object of reducing fever. Although he does not believe that these remedies are to be used for the reduction of temperature, he has certainly seen very marked relief follow their employment with the object of relieving the severe pain which occurs in the back, limbs, or head. Small doses are usually sufficient to at least reduce the suffering, if not to remove it entirely, but, as cardiac complications are by no means unusual, large doses are contraindicated in most persons. The author prefers to allow the patient to suffer from a moderate degree of pain rather than from the dangers incident to the administration of doses large enough to entirely relieve it, because in his experience these doses have to be very large if they are to be entirely competent as analgesics in influenza.

If any of the coal-tar products are used either for the relief of fever or of pain, phenacetin and acetanilid should be chosen. Experiments made in America and in Germany on animals have proved that phenacetin is far less toxic in its relations to the heart than is antipyrin or acetanilid, and while it has in a number of instances seemed more apt to produce cyanosis in man than either of the other drugs, this cyanosis rarely, if ever, has been associated with any other dangerous symptoms. Indeed, it is quite extraordinary the amount of cyanosis which phenacetin may produce without the respiration becoming greatly disordered, very much less cyanosis when caused by acetanilid or antipyrin being accompanied by much more alarming symptoms. A very favorite combination with practitioners who have had a large experience is one of salol and phenacetin. The action of the phenacetin in relieving the pain and in reducing the fever seems to point to it as a rational remedy, but the exact influence of salol under these circumstances is not so clear. Composed, as it is, of 60 per cent. of salicylic acid and 40 per cent. of carbolic acid, it seems to possess a therapeutical power different from that possessed by either of these two constituents alone, for neither carbolic acid nor salicylic acid has much power in the relief of pain when used alone, unless, as in the case of carbolic acid, it is applied directly to the part affected. Perhaps the condition of pain in the lumbar and other muscles during the attack of influenza is in some unknown way associated with the condition which we have called "rheumatism," and in which salicylic acid does good in an unknown manner. Salicylic acid alone might be equally useful if it were dissolved in the intestine and did not irritate the stomach.

On seeing a case of influenza during the first few hours of the attack the author resorts to those remedies which have been in use by the profession for many years, and, so far as he can learn, it is the custom of other members of the profession to give a mixture composed of tincture of aconite, spirit of nitrous ether, and a solution of citrate of potassium in preference to any other medicine at this time. This mixture possesses the advantage of increasing the action of the skin and kidneys, and of reducing the temperature, of quieting the circulation, and of being readily taken by the patient without danger of disordering the stomach at this time or later on, which is important, as this organ is apt to become irritable. As a general rule, citrate of potassium is given in too small doses, and, unless there are reasons to the contrary, it should be given in the dose of 10 to 15 grains (0.65–1.0) three times a day to an adult.

If the fever becomes excessive, so that there is danger of the patient suffering from a true hyperpyrexia, it is better to resort to cold bathing instead of the antipyretics just spoken of. It is true that the patients themselves and the friends of the patients will sometimes protest against what they deem an heroic measure, but the author is satisfied that if the cold is used in the proper manner it is devoid of danger to the patient. The majority of physicians do not seem to carry out the treatment of Brand and Liebermeister as it is carried out by its originators. Most of them forego the very important portion of the treatment, which consists in frictions designed to bring the heated blood to the surface, and the author has again and again seen physicians apply cold either by means of a wet sheet, by sponging, or a cold bath without using any measures which are directed against internal congestion. (See Cold and Fever.)

Hyperpyrexia in influenza does not seem to possess the same dangers that it does in the course of some other diseases. In the first place, as a general rule, the course of the disease is a brief one, and, although it may leave the patient weak and exhausted, the duration of the febrile portion of the malady does not extend beyond a few days. Clinical experience and physiological study have proved that it is not the temperature of 105° or 106° F. which is distinctly dangerous, but the continuation of this temperature for many hours which is harmful. Similarly, a patient ill from typhoid fever, having a temperature of 103° for many days, suffers very much more than does a patient who is suffering from pneumonia, and who may have for forty-eight hours a temperature of 104.5° or 105°. For these very reasons a temperature of 104.5°or 105° is not particularly alarming in the condition which we are considering, unless there are symptoms pointing to the fact that the patient is being injured by an excessive temperature, as may be indicated by somnolence and an exceedingly dry skin as well as cerebral symptoms. Of course, if renal trouble, associated with cardiac disease, comes on at this time, methods for the reduction of the temperature must be resorted to. The point to be strongly emphasized is that the mere existence of high temperature is not to be regarded as a condition to be overcome by the use of drugs.

It seems to be the general consensus of opinion, both in America and in England, that any measures of a *depleting* character are distinctly harmful in influenza, even at its earliest stages, and we would naturally expect that this would be the conclusion arrived at by physicians who treat their patients rationally. Although influenza is a short-lived disease, there is probably no malady in which the patient goes so quickly into a condition of profound depression, or even exhaustion, as in this one. The abstraction of blood from a vein or by the use of cups should not be resorted to, as it will increase the exhaustion. Before the system has a chance to recover from the onset of the attack it will be still further depressed by the therapeutic measures of the physician who is unwise enough to bleed.

As the case of influenza progresses a condition of marked depression, or even collapse, very frequently develops. The expression of anxiety on the patient's face is to a physician who is accustomed to see it in other diseases a most alarming symptom, and it is not until one has seen it repeatedly in influenza that he is able to give it its exact value. Associated with this condition, the skin is frequently covered with a profuse perspiration, and the pulse is very apt to be very rapid, running, feeble, and easily compressed. At first glance the old saying, that "we treat the symptoms as they arise," would seem to cover to a very large extent the indications which are present at this period; yet the author's experience, which may differ from that of some of his readers, is that the cardiac stimulant which we are most frequently accustomed to use—namely, digitalis—does not seem to *take hold* of the circulatory apparatus and to act upon it in the manner which is desired. It may be that the pressing symptoms have made us more anxious and impatient as to the use of any medicament, and that we have not had the patience to wait and allow such a slowly-acting remedy as digitalis to take effect. Be this as it may, the author regards strychnine as infinitely preferable to foxglove when these symptoms appear; and he has been able to prevent their appearance, or at any rate to modify them to a very great extent, by using strychnine in full doses from the first portion of the stage of depression. We believe that, as a general rule, strychnine is given in very much smaller doses than safety requires, and that in many instances it fails to act because the doses are too small to struggle with the profound condition of exhaustion which is present. In an adult we can see no reason why $\frac{1}{20}$ of a grain (0.003) may not be given three or four times in twenty-four hours, and in some cases we have given it every four hours without producing any of the symptoms of an overdose of strychnine. Divided doses are better than a few very large ones.

The author knows of no better illustration of the fact that in some conditions we are to give drugs for *effect* rather than according to customary dose than the employment of strychnine in influenza, and the physician who is timorous in the presence of this frequent complication, depression, certainly increases the patient's danger. As with everything else, the drug should be carefully watched, and at the first sign of muscular twitching or stiffness at the back of the neck its administration should be cut down or discontinued. In many instances where the collapse comes on suddenly the strychnine should be administered hypodermically and followed by full doses by the mouth, in order to keep up the full effect exercised by the drug upon the nervous and circulatory systems. In some cases it will be found that the blood-paths seem to be so relaxed and atonic that the strychnine is unable to produce a sufficient vascular effect to bring the patient out of his difficulties, and under these circumstances very good results follow the combination of belladonna with strychnine, the belladonna being, as we well know, a powerful vasomotor stimulant under such circumstances. It also should be given in full doses for effect. As the acute stage of depression passes off the belladonna should be stopped and the strychnine continued alone through convalescence. It is proper to point out, however, that strychnine is not a drug suitable for the purpose of producing constant stimulation. It is a whip to the nervous system, and if used in too large a dose for too long a time the overwhipped system fags out.

Alcohol has not seemed to be of much value during the active period of the disease. In milk-punches and eggnogs it is of course useful during convalescence.

If delirium comes on, it has not seemed to be a symptom of very serious character either for immediate results or in influencing the prognosis as to the ultimate recovery of the case, and in cases of pneumonia complicating grippe, in which delirium is the prominent symptom, it appears that delirium is not to be regarded in the same light as similar manifestations complicating ordinary pneumonia or other diseases. The delirium may be either talkative or muttering, but does not in the majority of cases require treatment, passing away with the fever and rarely extending into the stage of exhaustion.

For the irritative cough steam inhalations, laden in the first stage with benzoin or other innocuous and sedative substances, seem particularly useful. For the bronchitis which is often present it is generally sufficient to administer the ordinary mixtures, containing ipecac and potassium citrate, in the earliest stages, and to follow them by chloride of ammonium and cubebs in the later stages. The author does not think that the compound liquorice mixture containing antimony should be given in the second stage of influenza. A complication too apt to occur at this time is œdema of the lung or a widespread bronchitis, with a profound exudation which bids fair to drown the patient in his own secretions. Antimony is not only a substance depressing to the circulatory and respiratory systems, but aids very materially in causing the peculiar excess of secretion which has just been spoken of.

It may be necessary to use bromides if the cough is excessive, or to replace them by codeine or very small doses of morphine. In many cases still better results will be obtained by a good preparation of cannabis indica, which may be pushed until it relieves the cough without in any way endangering the patient's life—a safety which cannot be obtained by the employment of any other of the drugs named.

If sleeplessness is so pressing a symptom as to require attention, the bromides may be given, but it will be generally found that the insomnia comes after the attack rather than during it, or in any event it will not require attention until the patient is convalescent. Under these circumstances chloral or chloralamide, or even sulphonal, may be administered, care being taken, of course, in the case of chloral that the cardiac apparatus is in good condition, and in the case of sulphonal that it is administered in a powdered form or dissolved in hot water and given four or five hours before the time at which sleep is desired.

For the vertigo and dizziness which are sometimes bitterly complained of by the patient either during or after the attack, small doses of bromide with ergot or cannabis indica have seemed particularly valuable, probably because they exercise some effect upon the blood-vessels of the brain or its membranes or perhaps upon the blood-vessels of the ear. Certain it is that in those cases of tinnitus not associated with organic change in the aural canals bromides and ergot do more toward relieving them than any other medication.

In the constipation which is sometimes present in the early stages of influenza it is generally advisable to administer either castor oil or in other cases half an ounce (16.0) of the sulphate of magnesium, or for more fastidious patients the citrate of magnesium. A full purgative effect of any of these salines seems to lessen the fever when the bowels are unloaded. Care should be taken that the dose of the purgative is not excessively large, as it will weaken the patient as much as would bleeding. For the constipation following the attack probably no drug is as efficient as cascara sagrada, combined perhaps with aloin. (See Constipation.) If diarrhœa supplants the constipation, the ordinary astringents, such as aromatic sulphuric acid or hæmatoxylon, will be found sufficiently active. (See Diarrhœa.)

INSOMNIA.

Insomnia is a condition complicating many diseases, and arises from such a host of causes that the physician may not be able to discover them for some days after the patient is first seen. As a general rule, a patient consulting a physician with this symptom expects a prescription to be given at once and the cause of the insomnia found out afterward. Under these circumstances the physician may safely employ several drugs according to the information that he has concerning the patient's state.

One of the most common remedies is chloral given in the following manner:

℞.—Chloralis . . . . ʒiij (12.0).
Syrup. . . . . fʒiv (16.0).
Aquæ cinnamomi . . . . q. s. ad f℥iij (96.0).—M.
S.—Dessertspoonful (8.0) at night.

Or,

℞.—Butyl chloral-hydrat. . . . . ʒj (4.0).
Ft. in pil. No. xii.
S.—One, two, or three pills at night, as needed.

Where, for any reason, as the presence of a weak heart, chloral is contraindicated, resort may be had to the bromide of potassium or sodium, and if the patient is a female these drugs should always be accompanied by a small dose of arsenic, generally in the form of Fowler's solution, 1 to 3 drops (0.05–0.15) three times a day, in order to avoid all danger of the production of acne. The following prescription is useful:

℞.—Potassii bromid. . . . . ʒij (8.0).
Liq. potassii arsenit. . . . . fʒss (2.0).
Aquæ cinnamomi . . . . q. s. ad f℥vj (192.0).—M.
S.—One to two dessertspoonfuls (8.0–16.0) at night.

In many cases larger amounts of the bromide will be needed.

Where the sleeplessness is due to pain, chloral is of little value and bromides are worth but little more. Under these circumstances by resorting to what is known as the "crossed action of drugs," we can often obtain a very good effect. Thus morphine and chloral both act on the brain to produce sleep, or, in other words, their action is here crossed, for one relieves pain and the other does not; one kills by failure of the heart in overdose, the other by respiratory failure; as a consequence, large doses of neither can be given alone. The following is therefore a useful combination, either where one drug fails or when dangerously large doses of either alone have to be used to obtain the desired result:

℞.—Morphinæ sulphatis . . . . gr. iv (0.2).
Chloralis . . . . ʒij (8.0).
Syrup. . . . . f℥ij (60.0).
Aquæ . . . . q. s. ad f℥iv (128.0).—M.
S.—Dessertspoonful (8.0) at night.

In cases where insomnia is due to mania hyoscine is said to be very useful, given in the dose of $\frac{1}{100}$ to $\frac{1}{90}$ grain (0.0007) by the mouth or $\frac{1}{110}$ to $\frac{1}{100}$ grain (0.0006) by the hypodermic needle. Owing to its tastelessness the powder may be put on the tongue, and it is best to order a little sugar of milk or white sugar (1 grain) to be added to each dose of hyoscine, in order to give it bulk.

Where insomnia follows mental effort avoidance of all cerebral activity should be insisted upon during the evening, and if the feet are cold on going to bed sleep should be induced by relieving the cerebral congestion by a hot foot-bath or the use of a hot-water bag at the feet while cold is applied to the head.

During the last few years a very large number of remedies have been introduced as hypnotics, such as somnal, paraldehyde, chloralamide, sulphonal, trional, amylene hydrate, hypnal, and others. Not one of these is comparable in therapeutic activity with the older remedies. Of these the best, from every point of view, are sulphonal and trional. The dose of sulphonal and trional is 10 to 20 grains (0.65–1.3) in powder, but, as they are large in bulk and hard to swallow, they should be used in a prescription made up as follows:

℞.—Sulphonal. . . . . gr. xxx (2.0)
Syrupi simplicis . . . . fʒij (8.0).
Mucilaginis acaciæ . . . . fʒij (8.0).
Aquæ destillat. . . . . q. s. ad f℥j (32.0).—M.
S.—Half to all of this at one dose, as may be needed.

In other instances sulphonal may be dissolved in very hot water, and the solution swallowed before it cools sufficiently to permit precipitation.

Chloralamide may be used in the dose of 15 to 60 grains (1.0–4.0), dissolved in wine or given in capsule. Paraldehyde is given in the dose of 20 to 60 minims (1.3–4.0). As it is disagreeable in odor and taste, it must be given in capsule, and it is very apt to disorder the stomach.

The dose of amylene hydrate is the same as that of paraldehyde. It is a liquid, and, like the rest of the drugs named, with the exception of hypnal, has no effect in insomnia from pain.

Somnal is used in the dose of 10 to 40 minims (0.65–2.65) with liquorice and water, and possesses considerable power.

In the treatment of insomnia it should be remembered that if possible those drugs should be used which will quiet the part of the brain which is most active. Thus if the patient tosses much, we use bromides and chloral as motor depressants. If sensation is active, bromides and the hot pack are used to act as sensory quietants.

In some cases horseback exercise taken late in the afternoon does good, particularly if the patient follows a sedentary life. Many persons who are usually sleepless will obtain a refreshing slumber by taking a very light and easily-digested meal just before retiring for the night or by eating a cracker or drinking a glass of milk when they awake during the night.

INTERMITTENT FEVER.

In all forms of intermittent fever, whether the attacks are diurnal, quotidian, tertian, or quartan, the best remedy for their prevention is quinine, which should under these circumstances be given about two or three hours before the attack is expected, so as to be absorbed and be physiologically active when the paroxysm is due. This precaution is often overlooked, and the dose ordered at the time of the expected attack, with failure as a result. Not only should sufficient time elapse for absorption, but the fact should be remembered that the chill often begins an hour earlier each day, and will be in full sway before the quinine can stop it if the drug be not administered at the proper time. Experience has proved that quinine never acts as favorably if constipation is present as when the bowels are lax, and hepatic activity seems particularly necessary for its full effect. To obtain the full influence of the drug it should be preceded, by some four or five hours, by $\frac{1}{6}$ to $\frac{1}{4}$ grain (0.010–0.016) of calomel every fifteen minutes until a grain (0.05) is taken, or by a dose of podophyllin amounting to $\frac{1}{10}$ to $\frac{1}{8}$ grain (0.006–0.008). If podophyllin is used, a longer time should be allowed before the antiperiodic is given, because of the slow action of this purgative, and if the patient has been rendered unusually insensitive to purgatives, larger doses of both the remedies named must be used; particularly is this true in the South.

The dose of quinine varies with the exigencies of the case, which in turn generally depend upon the region in which the patient lives or has lived. 10 to 15 grains (0.65–1.0) in one dose are generally sufficient in the Eastern and Northern States, but as much as 20 to 45 (1.3–3.0), or even 60 grains (4.0) may be required in the southern parts of the United States and elsewhere. When still larger doses are employed, the drug should be given partly hypodermically and partly by the rectum in suppository or in solution, as well as by the stomach, as this viscus will rarely withstand 60 grains (4.0) of quinine without irritation. (For the best salts for hypodermic use, see article on Cinchona.) If the stomach is irritable, resort to these means of entrance into the body are absolutely necessary and must be entirely relied on.

In cases where the attacks are several days apart small doses of quinine of from 3 to 6 grains (0.15–0.3) are to be taken daily between the paroxysms, or, what is better, arsenic may be given in moderate dose for its antiperiodic influence during the intermission. In this manner the quinine acts with full force when most needed.

Having considered the prophylaxis of a chill, let us turn to the treatment of the attack itself. It must be remembered that the greater part of the harmful effect of the malarial poison is exerted at this time by the internal congestions and engorgement of the abdominal and thoracic organs. The physician should therefore try to prevent, as far as possible, too great a rigor, and if stasis results from the chill, overcome it, not by depletants, unless the case is very sthenic, but by stimulants, such as strychnine or digitalis, which will drive out the blood from the congested area.

If a full meal has just been eaten, the stomach should be emptied by an emetic dose of ipecac, 2 drachms (8.0) of the powdered drug to an adult, or by 20 grains (1.3) of sulphate of zinc. It is almost useless to give quinine at this time, as absorption from the stomach and subcutaneous tissues is almost entirely absent. Alcoholic stimulants are not to be employed, as clinical experience seems to indicate that they act unfavorably.

If the chill is severe enough to endanger the patient's life, measures must be used to control it. Chloroform may be inhaled, and immediately preceded by laudanum by the bowel or mouth. If the laudanum is given by the mouth, a little ether or chloroform may be added to the dose of the opiate. The opium may be used hypodermically in the form of morphine in the dose of $\frac{1}{6}$ of a grain (0.01) combined with $\frac{1}{60}$ of a grain (0.001) of atropine.

In the fevered stage little can be done except to give the patient comfort by cool drinks and cool sponging, or, if the fever becomes excessive, by the use of antipyrin, or, better still, the ice-pack. These measures have seldom to be used, as the fever is generally too fugitive to need such treatment.

The sweating stage needs no particular treatment, unless exhaustion is caused by it, when stimulants may be cautiously used as needed, and large draughts of water at ordinary temperatures swallowed.

Many measures have been resorted to to put off a malarial attack, the chief of which is the use of ether or chloroform anæsthetization at the time of the expected paroxysm, of nitrite of amyl or of the nitrite of potassium or sodium in 10-grain (0.65) dose for the same purpose. Where the "chill habit" exists and depends largely upon nervousness, it has been broken by misplacing the hands of the clock, and so getting the patient past the time for his attacks without his knowledge.

It should be remembered that the use of quinine in malarial fevers is no longer based on empiricism, but upon the fact that the drug exerts a peculiarly lethal influence over the cause of the disease, the *Plasmodium malariæ* of Marchiafava and Celli, or, as it is sometimes called, the malarial germ of Laveran or the hæmatozoön of malaria.

It is worth remembering that methylene blue possesses antimalarial properties in the dose of 1 to 4 grains (0.05–0.2). (See Methylene Blue.)

IRITIS.

Iritis, or inflammation of the iris, as usually encountered is caused either by syphilis, rheumatism, or gout. It may also be traumatic: less frequent causes are gonorrhœa, diabetes, malaria, and tuberculosis. Metastatic iritis occurs in pyæmia, relapsing fever, etc. The most marked symptoms are severe brow pain; fine ciliary injection; discoloration of the iris and immobility of the pupil, due to the formation of adhesions between the iris and the capsule of the lens. The most important local remedy is atropine, to be used every two hours according to circumstances. If for any reason this is not tolerated, duboisine, scopolamine, or daturine may be substituted. Cocaine increases the mydriatic power of atropine.

Pain may be relieved by leeches to the temple and the use of dry heat externally (cotton batting heated over a register will suffice) or hot fomentations—water, chamomile infusion, or laurel-water (1 : 15).

In traumatic iritis iced compresses are suitable in the early stages, but not in the later periods and not in any other form of iritis. Great care must be taken not to mistake iritis for conjunctivitis on the one hand, and glaucoma for iritis on the other; delayed use of atropine and the employment of astringents on account of the former error, or the instillation of atropine because of the latter, would constitute a serious therapeutical blunder. In serous iritis, or that variety in which there is a hypersecretion of the aqueous humor, which becomes turbid, and a precipitate of dark spots occurs upon the membrane of Descemet, atropine must be cautiously instilled, owing to the tendency to increased tension. If this occurs, paracentesis of the cornea may be needed, and pilocarpine should be given internally if the vitreous becomes opaque.

Subconjunctival injections of sublimate (2–5 drops of a 1 : 2000 solution) are recommended in syphilitic iritis, and, if the inflammation is not too acute, produce good results.

In true syphilitic iritis mercury must be pushed to the point of tolerance, but it is not necessary to salivate the patient. Any form of mercury usually employed in secondary syphilis may be used—calomel, blue mass, or protiodide of mercury—but the most efficacious method is by inunction: this is preferable even to hypodermic medication in the opinion of many authors. After the mercurial impression has been made and the pupil is well dilated, potassium iodide, either alone or in combination with bichloride of mercury, is indicated.

In plastic iritis, appearing six to eight months after the disappearance of the secondary symptoms, this latter treatment without the previous use of mercury has been recommended. Carmichael's plan, consisting in the administration of drachm doses of turpentine, in addition to which the potassium iodide may be given, receives the endorsement of some surgeons and is useful in serous iritis.

Rheumatic iritis calls for salicylic acid, oil of gaultheria, and, later, potassium iodide; in the chronic types of the affection Zollicoffer's mixture is an excellent remedy. Potassium iodide should be administered in gonorrhœal iritis, and relief occasionally follows a pilocarpine sweat. In all forms of iritis the treatment of the constitutional disorder which has occasioned the local inflammation is necessary, and if the iritis becomes purulent surgical interference is usually required. In any variety of iritis the intense pain should be alleviated with morphine or other anodyne sufficiently active to secure sleep. During the course of the disease saline laxatives may be administered, and after the subsidence and cessation of the specific treatment a course of iron tonics is an excellent routine practice.

KERATITIS.

Keratitis is the name applied to the various types of inflammation of the cornea. If this inflammation is associated with a breach in the continuity of the corneal surface, it is termed corneal ulcer, and four characteristic symptoms supply the indications for local treatment: (1) photophobia, or dread of light; (2) blepharospasm, or spasmodic contraction of the orbicularis muscle; (3) congestion of the blood-vessels; (4) pain; while any existing dyscrasia or constitutional condition upon which the local disease may depend requires general medication.

Interstitial Keratitis.

Interstitial keratitis is that form of chronic diffuse inflammation of the cornea characterized by ciliary congestion and a ground-glass appearance of this membrane, most common between the ages of five and fifteen years, and in the vast majority of cases the result of inherited syphilis. No local measure is sufficient, antisyphilitic treatment being of paramount importance. During the height of the ciliary congestion warm antiseptic lotions and atropine are indicated, the latter especially to prevent the tendency to iritis. Severe pain may be alleviated by the use of a leech to the temple if the subject be of sufficient age to justify the employment of local bleeding.

Various other types of keratitis are described as the result of constitutional disturbances, such as gout (Hutchinson), malaria (Kipp, Van Milligen), or any condition of the system associated with great exhaustion, such as irregularities in the menstrual functions, certain forms of pulmonary disorders (true herpes of the cornea, Horner). The local management of these cases does not differ from that which has been described. The coexisting constitutional disturbances must be combated with suitable remedies.

Phlyctenular Keratitis.

Phlyctenular keratitis appears in the form of small, blister-like bodies, sometimes single, sometimes multiple, frequently situated directly at the corneo-scleral margin, which become yellow, break down, and leave an open ulcer (phlyctenular ulcer), to which runs a leash of injected blood-vessels. The disease is common in children, often follows in the wake of the exanthemata, and is so frequently associated with a strumous diathesis that it was formerly called strumous ophthalmia. In the majority of cases there is coexisting nasal disease, especially adenoid vegetations, which is responsible for the frequent relapses of the disorder, even if does not cause it. Congestion may be relieved by frequent irrigation with a warm boric-acid solution. Pain and irritation call for the use of atropine drops (4 grains to the ounce [0.2 : 32.0]), which should be continued until the ulcer is covered with regenerated epithelium, when the process of cicatrization may be hastened by the insertion daily into the conjunctival sac of a small quantity of yellow-oxide-of-mercury salve or dusting it with finely-powdered calomel, providing the patient is not taking at the same time any form of iodine. During the whole treatment the eyes should be protected by dark glasses and the subject permitted to go out into the open air. All local treatment will prove unsatisfactory unless associated with strict hygiene, carefully regulated diet, and constitutional measures—tonics and alteratives—and the treatment of the naso-pharyngeal lesions.

If the photophobia becomes distressing in spite of the other treatment, it has been suggested that this may be relieved by the use of cocaine, a practice that by no means commends itself in corneal ulceration, in spite of the temporary relief from the local anæsthesia. Relief of this symptom in many instances follows the use of a douche of cold water on the closed eyelids, or by touching with blue-stone the ulcerated fissure at the external commissural angle, which is commonly an exciting cause of the spasmodic closure of the lids.

Suppurating Keratitis.

Suppurating keratitis, or that form of inflammation characterized by the formation of pus in the cornea, may be either diffuse, as, for example, a complication of purulent ophthalmia, or circumscribed, forming an *abscess of the cornea*. If the pus gathers in the bottom of the anterior chamber, the condition is called *hypopyon* and the disease *hypopyon keratitis*. These conditions require prompt treatment—namely, frequent application of hot compresses, which may be advantageously composed of slightly carbolized water, atropine drops, or, in the opinion of many, eserine (½ to 2 grains to the ounce [0.03 to 0.1 : 32.0]). If the abscess forms, the pus should be evacuated by a formal operation, either by dividing the anterior surface or by performing the operation after the manner of Saemisch.

In addition to the types of disease which have been described we have the examples of *sloughing* or *infective ulcers*, which are seen under a variety of conditions, and often are directly traceable to an injury, being more common in elderly people. The tendency of all these ulcers is to spread, from whence one important variety has received the name *serpiginous*. The mild measures are antiseptic lotions, either boric acid or bichloride of mercury, iodoform, hot compresses, and instillations of either atropine or eserine. Formerly atropine was almost exclusively used; in recent years eserine has been much employed. It certainly has the power of limiting a sloughing process in the cornea. Threatened perforation may be averted by a pressure bandage. This is made by placing upon the eye a wad of antiseptic cotton, over which, in figure-of-eight turns, a flannel roller is applied. If in spite of this the process continues, the following measures have met with the greatest success: Touching the margin of the ulcer with a strong solution of nitrate of silver, 10 to 20 grains to the ounce (0.65–1.3 : 32.0), care being taken that the ulcer alone receives the application; scraping the floor of the ulcer with a small curette or spud and dusting upon its surface iodoform; finally—and this, in cases in which the ulceration is not too extensive, is the best method—the use of the actual cautery. In every case of sloughing ulcer the lachrymal passages must be explored for obstruction.

Sequelæ of Corneal Ulceration.

After healing of a corneal ulcer the cicatrix consists of a more or less dense white spot in the cornea (macula). If these scars are thick and white, they are irremediable by local medication and require surgical interference for optical relief. If, however, they are diffuse, much good will follow systematic massage of the cornea, aided by the introduction of a small particle of yellow-oxide-of-mercury salve. The massage is performed as follows: A piece of the salve the size of a split pea is introduced beneath the upper lid; upon the closed lid a finger is placed, and regular motions made through the lid over the surface of the cornea—namely, vertical, lateral, and radial motions, the *séance* being completed by circular movements. The whole should last from one to three minutes. Alleman claims excellent results in dissipating corneal opacities by the use of electricity by connecting a suitably prepared electrode with a battery, the cathode being placed directly on the previously anæsthetized cornea and the anode on the cheek.

LACHRYMAL ABSCESS.

Lachrymal abscess results from suppuration in a chronically distended lachrymal sac, owing to the presence of obstruction in the nasal duct, and exists as a swelling under the skin at the inner canthus, pressure upon the surface causing an escape of pus through the canaliculi. The treatment is practically confined to surgical interference—that is, division of the canaliculi and washing out the distended sac with antiseptic fluids, and restoring the patulency of the nasal duct by the use of probes as soon as the inflammatory symptoms have subsided, or, if the skin over the seat of the abscess is thinned and rupture is threatened, by free puncture downward and outward. In purulent discharge from the lachrymo-nasal duct solutions of blue pyoktanin (1 : 1000), injected through the passage, favorably modify the unhealthy secretions. Much comfort will ensue from the use of hot compresses over the inflamed area. These may be made in the ordinary way, or are still more efficacious if composed of a lead lotion, the ordinary lead-water and laudanum answering the purpose very well.

LARYNGITIS (ACUTE).

The treatment of acute laryngitis is identical in many respects with that directed against acute inflammatory processes elsewhere. It may be divided into local, external, and internal methods. The condition of the larynx when acutely inflamed is that of intense hyperæmia and irritation, and the object of the physician must be to allay this irritability. This is best accomplished by the use of compound tincture of benzoin, which is placed in boiling hot water (1 ounce to the pint [32.0 : 500 cc.]), and the steam inhaled as it rises from a pitcher or as it passes out of the nozzle of a deep coffee-pot. A better apparatus, if it can be obtained, is a can or wide-mouthed bottle arranged with one long and one short tube like a Wolff bottle, the air being drawn into the larynx through the short tube. This inhalation should be resorted to six or eight times a day, but the patient must not go out of doors or into a cold room, as the steam relaxes the parts involved and renders them more susceptible to cold. Sometimes advantage is gained by adding to this inhalation 1 grain (0.05) of menthol. If the patient is unable to remain in an equable temperature, then the steam-inhaler should be supplanted by the use by the physician of an Oliver nebulizer, and in this atomizer should be placed a mixture as follows:

℞.—Menthol . . . . gr. iij (0.15).
Albolene . . . . f℥j (32.0).—M.
S.—Use as a spray.

The patient is directed to gently inhale this vapor, which because of its lightness readily passes deeply into the air-passages, and has the effect of soothing rather than irritating them as does the spray from an atomizer.

Rarely in the very acute stages of laryngitis should the physician employ a watery spray to wash the laryngeal mucous membrane, as it is apt to increase the irritation. If any aqueous spray is used, as may be necessary when the irritation has resulted from the inhalation of dust, it may be made up as follows:

℞.—Sodii chlorid.	gr. xv (1.0).
Acid. boric.	gr. x (0.65).
Sodii borat.	gr. x (0.65).
Aquæ rosæ	f℥iij (96.0).—M.

S.—Use as a spray.

The external treatment, if the inflammation is exceedingly severe and the patient can be confined to bed, is a mustard plaster or hot application over the larynx, care being taken that the volatile mustard does not render the inhaled air irritating to the larynx. A mustard foot-bath and a warm drink on going to bed are useful.

The internal treatment should consist in opening the bowels with calomel and a saline purgative if constipation is present, and in the adminstration of full doses of aconite and bromide of sodium or potassium, as follows:

℞.—Tinc. aconiti	♏xij vel xxiv (1.0-1.6).
Sodii bromidi	ℨij (8.0).
Syr. lactucarii (Aubergier)	f℥j (32.0).
Aquæ	q. s. ad f℥iij (96.0).—M.

S.—Dessertspoonful (8.0) every hour for six or eight doses.

This prescription may in many cases be continued until convalescence, as it stops cough, quiets the inflamed area, and allays arterial excitement. Often it is best to omit the aconite after the first few days. By the second day the patient should be directed to make a heavy application of tincture of iodine over the trachea and episternal notch, as high as is possible without the stain showing above the collar. In children and in some adults this is well substituted by oil of amber and sweet oil in the proportion of 1 to 3 parts rubbed on the skin.

For the stiffness following the inflammation preparations of coca are very useful, given internally, and tonics to the general system are needed.

LEUCORRHŒA.

This is a condition—vulgarly known as the "whites"—consisting in a hypersecretion from those glands which pour out their contents into the vagina or the cervical canal of the uterus, or even into the cavity of this organ.

It is a state dependent upon many causes for its existence, the chief of which is a condition of the system when it is "run down" from any cause, with perverted functions of the glands or their surroundings. In some persons, who seem perfectly strong and well it would appear to be due to an effort of the system to overcome plethora. The character of the discharge varies with almost every case. In some instances it is thick and tenacious, in others so liquid as to trickle down the limbs in a stream and greatly soil the clothing. In most of the latter cases catarrh of the Fallopian tubes or ovarian irritation and tenderness will be present. Where the secretion is very thick and tenacious it generally arises from the cervical canal, while that from disorder of the vaginal wall alone, independent of other morbid conditions, may be either thick or thin.

The treatment of these forms of leucorrhœa may be divided into two parts—one, that directed to the remedying of the morbid process through the use of drugs by the mouth; the other, by their employment locally.

It is needless to state that in that form dependent upon excessive lactation or other exhausting manner of life tonics of an active character are needed. As a general rule, anæmia will be present, and the following pill will be found of service:

℞.—Acid. arsenosi . . . . gr. ¼ (0.016).
Ferri redacti . . . . gr. v (0.25).
Quininæ sulph. . . . . ℈j (1.3).—M.
Ft. in pil. No. xx.
S.—One pill three times a day, after meals, for an adult.

Or,

℞.—Tr. cinchonæ comp. . . . . f℥ij (64.0).
Tr. gentian. comp. . . . . q. s. ad f℥iv (128.0).—M.
S.—Dessertspoonful (8.0) three times a day, after meals.[1]

Sometimes small doses of the sulphate of iron are better for this purpose, owing to its astringent properties, but when any preparations of iron are used care must be taken that the bowels are kept active and that the stomach is not disordered. Associated with the use of these internal remedies should be a moderate amount of exercise and the avoidance of late hours and rich foods.

The local applications which are of value in these states consist in counter-irritation and vaginal injections or painting the mucous membrane of the parts from which the discharge comes with proper fluids. In the leucorrhœa dependent upon irritation of the ovaries with catarrh of the Fallopian tubes the use of small blisters formed by the employment of cantharidal collodion or a cantharidal plaster over the groin on either side is often accompanied by good results. At the same time the vaginal surfaces surrounding the cervix uteri may be painted with a mixture of iodine, carbolic acid, and chloral, such as is used by Dr. Goodell, as follows:

℞.—Iodi resublimat. . . . . ʒiv (16.0).
Acid. carbol. crystal. }
Chloralis } . . . . āā ℥j (32.0).
Rub the iodine and chloral in a glass mortar into a powder and add the carbolic acid.
S.—Formula. To be used by the physician only.

The following pill may also be employed:

℞.—Hydrarg. chlor. corros. . . . . . . gr. ½ (0.03).
Ft. in pil. No. xx.
S.—One pill three times a day, after meals or a tablet triturate may be used instead of a pill.

The remaining treatment of watery leucorrhœa consists in the use of astringent injections. A very cheap astringent injection is made lifting heavy weights or it results from other strains. In many cases acupuncture is very useful, particularly if the trouble is bilateral. (See Part III.) Sometimes after the employment of this measure the patient can straighten the back at once and retain that position. In other instances antipyrin or acetanilid, in 5- to 10-grain (0.35–0.65) doses of the former and 2- to 4-grain (0.1–0.2) doses of the latter, are of service, and iodide of potassium and salicylic acid are not to be forgotten if the condition of the patient does not rapidly improve. Phenacetin and salol are also useful, combined or alone. A large hot poultice applied to the back is often efficacious in obstinate cases. Sometimes the use of a hot foot-bath and a Dover's powder on going to bed will produce a cure, and ironing the back with an ordinary hot laundry iron at a proper heat, a piece of newspaper or cloth being placed over the skin under the iron, is very efficient. Counter-irritation in the shape of a blister, a mustard plaster, or capsicum draft will often give relief.

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[1] In both these prescriptions the small amount of iron and arsenic given will probably be noted, but this is done advisedly, as iron and arsenic do as much good to the blood in small as in large amounts under most circumstances. (See Iron.)

Where these measures fail the reverse treatment may be tried, such as an ice-bag placed over the loins or an ether spray turned on the part until the skin is greatly blanched.

MALARIAL FEVER.

(See INTERMITTENT and REMITTENT FEVERS and PERNICIOUS MALARIAL FEVER.)

MANIA (ACUTE).

Space is wanting to consider the thorough and complete treatment of mania as it comes to the neurologist. All that can be done here is to denote temporary measures suitable for cases which are brief in their course.

In those cases which occur after confinement and are not supposed to be based upon permanent trouble, cimicifuga racemosa is said to be very useful in the dose of 20 to 30 drops (1.3–2.0) of the fluid extract three times a day, while for the rapid quieting of the patient we may use hyoscine hydrobromate in the dose of $\frac{1}{100}$ grain (0.0006). In other instances, if the kidneys and heart are healthy, full doses of chloral may be used, and if an active preparation of cannabis indica can be had, at least 1 grain (0.05) of the solid extract or $\frac{1}{2}$ to 1 drachm (2.0–4.0) of the tincture should be employed. Cannabis indica will be found particularly serviceable if 60 grains (4.0) of one of the bromides can be combined with it.

Where a patient suffering from mania is so violent that nothing can be done with him, he should be held, and an emetic dose of $\frac{1}{12}$ grain (0.005) of apomorphine be given hypodermically to produce vomiting and so relax the muscular system, or he may be tied or anæsthetized sufficiently to enable the physician to administer proper remedies. Sometimes full doses of morphine are needful, and in others a cold douche to the head while the body is in hot water is of service.

MELANCHOLIA.

This is not the place for the discussion of melancholia of so severe a form as to amount to insanity, since the treatment of this latter state is very various and largely depends upon the skill of trained physicians who are alienists.

There is one form of melancholia, however, which may often be rapidly relieved by a simple measure. It is that dependent upon the condition of the system in which oxaluria is present. Whenever an individual complains of melancholia the urine should be examined, and if any oxalate crystals are found, undiluted, fresh nitromuriatic acid should be given in the dose of 5 drops (0.3) after each meal in a half-tumblerful or more of water. In order to guard against errors in diagnosis it is well to remember that pears, tomatoes, rhubarb, and cabbage all cause oxalates to appear in the urine for a short period after their ingestion.

MENINGITIS (ACUTE).

Meningitis is to be treated as is any other form of acute inflammation occurring in a sthenic or dynamic individual, and particularly does its treatment correspond to that of the other inflammations of large serous membranes, such as peritonitis or pleurisy.

In the early stages the patient should receive sufficiently large doses of aconite or veratrum viride to strongly impress the circulatory system. These drugs have the power of producing such dilatation of the blood-paths throughout the body that the congested or inflamed area is relieved of its excess of blood, because, the pressure being less elsewhere, the blood obeys the law that liquids always try to escape from pressure, and so leaves the meninges of the brain for the vessels of the limbs and trunk. A good-sized blister should always be placed at the nape of the neck as a counter-irritant to prevent effusion.

The proper dose of veratrum viride in the form of the tincture is 3 drops (0.15) every hour until the skin becomes moist or nausea is developed.[1] The tincture of aconite is also useful in full dose. If great arterial excitement is present, venesection may be practised (see Bleeding), but veratrum viride and aconite are better remedies if they are at hand. Associated with these two drugs we should employ mercury and opium, the first for its antiphlogistic influence, the second for its power in allaying irritation. ¼ grain (0.016) of powdered opium and ½ grain (0.03) of calomel may be given every hour until the full effect of the opium or mercury is manifested. In some instances the deodorized tincture of opium (*Tinctura opii deodorati*) is better than the crude drug, in the dose of 2 to 5 drops (0.1–0.25) every one or two hours. Sometimes belladonna is of great service, and this is particularly the case where the drugs already named are contraindicated because of a condition of weakness or asthenia. In both conditions ergot is of value in allaying the congestion, but its period for exerting a favorable effect is not at the very first part of the attack, but a little later, when the stage of exudation is at hand.

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[1] It is to be remembered that veratrum viride often causes nausea, and even vomiting, in susceptible persons, and in consequence it should be carefully given in meningitis, lest if vomiting come on the disease be made worse.

During the first acute stage an ice-bag should be applied to the head, both for its local influence and its antipyretic effect, and leeches may be put at the nape of the neck with advantage. As the disease advances and the nervous disorders of the affection become marked, nervous sedatives are required to allay the twitchings, muscular spasms, or convulsions, and for this purpose no drugs are to be compared to chloral and the bromides. The doses to be used vary with the violence of the symptoms, but it may be stated that the chloral should rarely, if ever, be used in doses above 10 grains (0.65), and the bromides given in the dose of from 5 to 40 grains (0.3–2.65). If coma comes on, a large blister should be applied to the nape of the neck.

Quinine has been recommended in meningitis, but it is absolutely contraindicated, as it predisposes to this condition. It may be employed only in convalescence, and then used most carefully.

The treatment of the second stage of meningitis must be necessarily supportive, owing to the reaction consequent upon great nervous and arterial excitement. Under these circumstances the use of opium is still indicated, because it allays nervous unrest and supports the system, partly by conserving the tissues and partly by inhibiting the waste of nervous force apt to occur at this time. Alcohol should be given with the food if weakness is present, and a very simple or milk diet insisted upon.

MIGRAINE.

(See Neuralgia.)

MUSCÆ VOLITANTES.

Muscæ volitantes is the name applied to the dark specks which patients frequently see floating across their fields of vision, especially if the eyes are directed toward a bright sky or a white page. Usually they indicate no disease of the vitreous humor, and the ophthalmoscope fails to detect abnormal changes. They are attributed to torpidity of the liver by the laity. Muscæ volitantes may indicate eyestrain, and if the refraction is abnormal this should be corrected; a mild course of alteratives is often a useful adjuvant.

MYALGIA.

Soreness of the muscles either on pressure or on movement may be dependent upon a number of causes, such as strains, bruises, rheumatic taint, or inflammation due to cold. Here, as in many other states, the treatment is to be divided into the external and the internal methods. Of the internal remedies, the best are the salicylates or the iodide of potassium if rheumatism be at the base of the trouble. On the other hand, if a bruise or cold be the cause the chloride of ammonium will be of service in 10- or 20-grain (0.65–1.3) doses given in a solution with extract of liquorice. (For prescription see Bronchitis.) Other remedies which may be tried with a good chance of success are full doses of a good fluid extract of cimicifuga (20 drops to 1 drachm [1.3–4.0]) or the citrate or acetate of potassium in 20-grain (1.3) doses.

The local medications are numerous, but only a few can be considered as worthy of routine employment. The chief one is iodine, in the form of the pure ointment or diluted one-half with lard if the skin is easily irritated. Another method is to employ a liniment, well rubbed into the skin, made up as follows:

℞.—Tr. belladonnæ . . . . f℥j (4.0).
Tr. aconiti . . . . f℥ij (8.0).
Tr. opii . . . . f℥ij (8.0).
Liniment. saponis . . . . q. s. ad f℥vj (192.0).—M.
S.—Poison. To be used externally and only as a liniment.

Sometimes chloroform liniment is singularly successful, and poultices applied as hot as can be borne and covered by oil-silk and cotton to retain the heat are often of great value. Massage or good rubbing is also a *sine quâ non* for the successful treatment of this state.

NASAL CATARRH (ATROPHIC).

In atrophic nasal catarrh the nostrils are roomy and the mucous membrane red and shiny. The formation of connective tissue has, to a great degree, obliterated the delicate serous glands, and the discharge of mucus, no longer diluted, forms inspissated crusts, which adhere to the mucous membrane of the septum and turbinated bones.

Areas of ulcerated or abraded membrane are disclosed upon removal of these adherent crusts.

The turbinated bones are gradually absorbed and the secreting surface thereby much reduced. Sometimes the wasting is so great that the posterior wall of the pharynx is clearly visible from the front. The inspissated secretion may make a cast of the nostril, and as fresh layers form underneath the oldest part is raised until the whole interior of the nostril becomes a mass of decomposition, giving rise to an overpowering stench. This form of catarrh causes loss of the sense of smell, and the odor is not recognized by the patient himself. Ulceration or caries of the bony structure produces an odor even worse than the so-called *ozæna*. The *pharynx* suffers from the general wasting, and presents a dry, varnished appearance called *pharyngitis sicca*, which is rather a symptom of nasal atrophy than a separate disease of the pharynx.

The indications are the removal of all accumulations in the nose and naso-pharynx and the healing of abraded or ulcerated surfaces.

The early removal of dead bone is imperative, and what secreting surface remains must be stimulated as far as possible, to compensate, in a measure, for the glands that are hopelessly destroyed. In other words, our efforts are directed toward producing a *compensatory hypertrophy* of the glandular tissue that remains. Therefore with the use of antisepsis we combine alteratives and local stimulation.

The nose should be thoroughly cleansed with an alkaline wash—Dobell's solution—warmed to increase its solvent power. To relieve the *odor* increase the amount of carbolic acid or substitute for it eucalyptol and thymol in the wash. Listerine contains both of these, and may be added to the wash. Its own pungent odor masks somewhat the offensive odor. Permanganate of potassium may be used in weak solutions, but it is painful except when sensation is entirely lost. Peroxide of hydrogen is recommended, but the writer has had no experience in using it over such an extensive surface.

The solutions are best applied by means of an atomizer or post-nasal syringe in the hands of the physician or by snuffing from the hand or cup.

The odor, if due to decomposition, is much decreased as soon as the passages are clear. The discharge must never be allowed to reaccumulate or much time will be lost.

Ulcerations require local stimulation by a strong solution of nitrate of silver or a superficial application of the flat surface of the galvano-cautery heated to a dull redness. Necrosed bone should be removed, and it is often found detached in the nostril.

Local stimulants should be judiciously combined with alteratives. Powders of nitrate of silver in starch, varying in strength from 1 to 10 grains to 2½ drachms (0.65–10.0) of the latter, may be blown into the nostrils by means of an insufflator. Cover gently the whole surface with a thin layer, and use it only of sufficient strength to be slightly felt. Nitrate of silver, in solution, 1 to 10 grains to 1 fluid-ounce (0.05–0.65 : 32.0), gives better results at other times when applied to the mucous membrane. Avoid over-stimulating, and so exhausting, the glands which it is wished to strengthen. The use of alteratives may alternate with the silver salt and iodide of potassium, and this may be done by using solutions of *iodine* and *glycerin*, as recommended for hypertrophic nasal catarrh. *Internally*, the physician should employ iodide of potassium to increase nasal secretions and mucous-membrane stimulants and tonics. He should also pay attention to the activity of the skin.

NASAL CATARRH (CHRONIC).

Chronic nasal catarrh is essentially a disease of civilization, which may occur at any period of life, but more commonly develops from youth to early adult life.

Although more prevalent among the upper classes, it is in the lower ranks that it most frequently reaches its later stages and its worst forms. This does not result from lack of opportunity for treatment, but from the ignorance or indifference which this class show to diseases while there is no suffering and no interference with business.

Hypertrophic nasal catarrh commonly has its origin in a neglected cold in the head or in a series of colds occurring in rapid succession, keeping the nose in a congested state until the erectile tissue covering the turbinated bones loses in a measure its power of contracting, and, decreasing the calibre of the nostrils, becomes a source of permanent obstruction to breathing.

As the disease increases there is increased susceptibility to cold. Slight exposure produces a stuffy feeling in the nose. The nostrils may become completely occluded; usually, however, only one side at a time is obstructed at first, the obstruction showing a tendency to change sides. This change is most noticeable in turning in bed, the lower side usually stopping, and on changing the position the obstruction is reversed, the clearing being accompanied by a crackling sensation. A slight tickling cough and tendency to clear the throat in the mornings may result from irritation of the pharynx or larynx.

The first indications for *treatment* are the reduction of inflammation and restoration of the breathing-space.

As the chief function of the nose is respiratory, the re-establishment of free nasal respiration, combined with the liberal use of antiseptic washes, will lessen the inflammation and irritation and produce a healthier state of the secretions.

The writer places *cleanliness* at the head of the list of remedial measures. The alkaline wash recommended on page 493, sprayed into the nose by a hand atomizer or gently snuffed from the palm of the hand or from a small cup, gives good results. The hand warms the solution slightly, but when snuffed from a cup the solution should be artificially warmed. This wash may be used two or more times a day.

The nasal douche should never be used where there is nasal obstruction, on account of the risk of forcing the solution into the Eustachian tube and causing catarrh of the middle ear.

In addition to the antiseptic wash where the mucous membrane is congested and irritable, the treatment recommended for coryza may be instituted for a few days with good results. A solution composed of equal parts of distilled extract of hamamelis and water or a dilute solution of hydrastis may be sprayed into the nose during the acute stage.

A little later a spray of ferric alum, 5 grains to the ounce (0.3 : 32.0), may be applied carefully in an atomizer by the physician.

It is not advisable to use alum in any considerable strength in the nose, as its continued use is liable to impair the sense of smell.

The alterative and absorbent action of *iodine* makes it a valuable remedy for local application in chronic nasal catarrh. Combine it with glycerin in the strength of 6 or 8 grains to the ounce (0.35 : 32.0), with enough potassium iodide to make a solution. Apply this by means of a piece of absorbent cotton on the end of an applicator, along the floor of the nose, until it reaches the pharynx. It is needless to say that such an application as this should be made with the utmost gentleness. The cotton should project beyond the probe, and care should be taken to avoid bruising the tissues.

After the acute stage has subsided, as shown by the disappearance of the livid color and lessened sensibility, any remaining hypertrophied tissue should be removed by a snare or the galvano-cautery.

NEPHRITIS (ACUTE).

The treatment of acute nephritis accompanied by any active inflammatory change requires intelligent care. The pain in the loins, and perhaps the bloody urine, which is scanty and high-colored, febrile disturbance, and the history of exposure or other exciting cause, all form a clinical history typical in its major points. Here, as elsewhere, for the reduction of inflammation circulatory depressants are to be resorted to, and aconite is generally most serviceable. The patient should be kept quietly in bed and supplied with a milk diet, cups or leeches being used over the loins if the urine is scanty. Blisters are not advisable, as the irritant substances producing them may be absorbed and cause increased renal irritation. The restlessness will generally be quieted by the aconite; but if this fails, resort must be had to bromides or small doses of opium, which must be given cautiously, as these drugs are not readily eliminated when the kidneys are diseased. Cannabis indica is thought to be of great service if bloody urine is present, but chloral is generally too irritating to the kidney to justify its employment. The appearance of large amounts of blood in the urine at about the fifth day of the illness is an indication, according to Sydney Ringer, for the use of drop doses of tincture of cantharides, given every few hours. Should the urine be scanty and of high specific gravity, and constipation be present, a purgative dose ($\frac{1}{2}$ an ounce [16.0]) of sulphate of magnesium should be used to aid in the elimination of impurities by the bowel. Warm mucilaginous drinks, as flaxseed tea, are of service, and the use of the citrate of potassium and the sweet spirit of nitre with copious draughts of pure water should be resorted to to increase urinary flow.

If dropsy or symptoms of uræmia come on, they may be relieved by the use of hydragogue purges, such as elaterium, which is particularly useful in that it is supposed to aid in the elimination of the urea by the bowel. Jaborandi or pilocarpine may be used to sweat the patient at this time or in the earlier stages with advantage; $\frac{1}{8}$ grain (0.008) of the hydrochlorate should be given hypodermically, and repeated in fifteen minutes if no sweat appears; but it should never be forgotten that when the heart is feeble or the patient very susceptible pilocarpine may produce serious collapse. This can sometimes be guarded against by the use of strychnine in $\frac{1}{20}$-grain (0.003) doses. Hot-air baths are often useful to provoke a sweat. (See Heat, in Part III.)

Generally these cases go on to recovery, although convalescence is often somewhat prolonged.

The treatment of the later stages consists in the use of stimulants to the kidneys to arouse them from the atony consequent upon the excitement of inflammation. To this end digitalis and squill, or digitalis and calomel, or caffeine citrate, may be used in small amounts, gradually increased and followed by the compound spirit of juniper or gin as the case progresses. If the renal structure is persistently atonic, ¼ to 1 drop (0.01–0.05) of the tincture of cantharides at each dose may be used, and, as anæmia is often a prominent symptom, tincture of the chloride of iron, which is both a diuretic and a tonic, should be resorted to. If renal hemorrhage is excessive, gallic acid and ergot are indicated to control the bleeding. A milk diet should be rigidly enforced. (See Uræmia.)

NEPHRITIS (CHRONIC).

The treatment of chronic nephritis is a very different matter, so far as prognosis is concerned, from that of the acute form. It is almost, if not quite, impossible to cure the condition present, and we can only improve the state of the kidneys and other organs by care and the use of proper drugs. As Tyson has aptly put it, we must try to arrest the development of the renal lesions and improve the general health, treat the symptoms which are not dependent upon the nephritis, except indirectly, and, last, treat those signs which are due to the nephritis itself. To arrest the disease all alcoholic drinks should be avoided as far as possible, and business cares and worries be cast aside. Great care should be taken to avoid cold, and a warm climate is generally to be recommended to the patient, since sudden changes of temperature tend to produce congestion of the kidneys by the chilling of the skin.

The diet and drink are important considerations, and should consist largely of milk. Many physicians direct that skimmed milk be used. The author believes that this advice is not wise, as it deprives the patient of the nutritive fats, which he needs and which are not contraindicated, whereas the proteids of skimmed milk, while the best form of albuminoid food we can give, are not advantageous, but have to be used to maintain nutrition. If the cream in the milk disagrees with the patient, it may be removed in part or diluted by the addition of water. Beyond this we can do little toward a *cure*. To allay symptoms we can do much, and the albuminuria can be greatly decreased by the use of digitalis, squill, the acetate and bitartrate of potassium, and the iodides; nor should the bichloride and protiodide of mercury be forgotten, as they are very valuable indeed. These remedies are also of value to relieve the dropsy, and the most efficacious treatment of all is a combination of the bitartrate of potassium and juniper-berries, so that 1 ounce (32.0) of the former is dissolved in 1 pint (500 cc.) of an infusion of the latter and taken in twenty-four hours. A most valuable aid in decreasing the albuminuria is the use of 1 to 3 drops of tincture of cantharides in water three times a day, particularly if the kidney seems torpid and is secreting too little urine. If dropsy develops, hydragogue purges are useful, such as jalap and elaterium, and hot baths, Turkish or Russian, are to be given, not only to relieve the dropsy, but to so hypertrophy the excretory glands of the skin that they will be able through greater activity to relieve the kidneys. (See Heat.) Sugar of milk may be given in the dose of 40 to 80 grains (2.65–5.5) a day as a diuretic, and buttermilk is a useful form of food. (See Sugar of Milk.)

Ascites or thoracic effusions should be treated by tapping.

In the chronic interstitial forms of this disease Bartholow has highly recommended the use of the chloride of gold and sodium in the dose of $\frac{1}{20}$ to $\frac{1}{10}$ grain (0.003–0.006). The anæmia is to be combated by the use of the tincture of the chloride of iron, or Basham's Mixture (see Iron), and oxygen inhalations.

The arsenite of sodium and the carbonate or citrate of lithium are also said to be of value in chronic contracted kidney, particularly if it is dependent upon a gouty taint. The dose of the former should be $\frac{1}{20}$ grain (0.003), and of the latter 5 grains (0.35), three times a day. (See Uræmia).

NEURALGIA.

Like headache, neuralgia gives rise to most of the suffering experienced by active persons who are not sick enough for bed and by those who are confined to bed by other diseases. It affects members of every walk of life, and may be so severe as entirely to incapacitate the most powerful of men.

The causes of neuralgia are very various, but they may be briefly stated to depend chiefly upon malnutrition, over-work, nervous excitement with consequent reaction, and to reflex irritation from diseased organs, as in the case of supraorbital neuralgia from eye-strain or ovarian irritation or uterine inflammation. Nerves functionally diseased are always *more* or *less* active than normal; that is, *hyper*-excited or *hypo*-excited, above or below par. In both cases they must be brought back to their normal tone by appropriate remedies, and these consist in nervous excitants and nervous sedatives. To give a nerve already depressed the additional depression of a bromide, or a nerve excited the additional excitement of strychnine, would be absurd.

From what has just been said it becomes evident that the physician must always determine the condition of the system of his patient and the causes of that condition before administering remedies.

The treatment of this condition of neuralgia from its curative standpoint may be divided into the use of tonics, nutritives, and palliatives.

Where neuralgia is associated with anæmia no hope of permanent relief can be looked for unless iron and arsenic are used until the anæmia is cured, and it is often necessary to combine with these drugs the use of cod-liver oil and bitter tonics. These are the cases, too, in which nux vomica and strychnine raise the depressed nerves to increased activity, and so bring relief. How they do this is not known, but we know enough to recognize one or two important facts. Strychnine is certainly a nervous stimulant, and is also a stimulant to the anterior columns of the spinal cord. It probably also acts upon the trophic centres in the anterior cornua of the spinal cord, and by stimulating these centres increases the nutrition of the tributary nerve-fibres.

It is needless to state that the neuralgias of syphilis and scrofulosis are to be treated by the specific remedies directed to the cure of these affections, while at the same time the various symptoms are carefully controlled by appropriate palliatives.

When nervous exhaustion causes neuralgia, phosphorus is a useful remedy, particularly in those cases which are convalescing from acute fevers.

Sometimes malarial poisoning produces a violent form of supraorbital pain known as "brow ague," which is to be relieved, not by ordinary remedies, but by large doses of quinine.

The relief of the states producing neuralgia having been spoken of, it yet remains for us to consider the measures to be adopted for the cure of an attack. Fortunately, the recent advances of therapeutic study have placed in our hands a large list of drugs not apt to produce a habit after prolonged use, comparatively safe though active, and not of disagreeable taste or evil general effect. By these terms the writer refers to antipyrin, acetanilid, and phenacetin, all of which possess wonderful power in the alleviation of pain dependent upon true nervous involvement. In order to avoid failure in the use of these drugs in the relief of headache, we must always remember that their field of service is that of neuralgic pain, not other pains. Antipyrin is to be used in the dose of 5 to 20 grains (0.3–1.3) for ordinary neuralgia or the pain arising from the crisis of locomotor ataxia, acetanilid in the dose of 3 to 8 grains (0.18–0.5) for the same purposes, and phenacetin in the same amount as acetanilid.

Upon these remedies, combined with caffeine and the bromides according to circumstances, we now depend, and the following prescriptions will be found of service:

℞.—Antipyrini . . . . ʒj vel ʒij (4.0–8.0).
Caffeinæ citratis . . . . gr. xx (1.3).—M.
Ft. in chart No. x.
S.—One every thirty minutes till relieved.

The following may be of use also:

℞.—Antipyrini . . . . ʒj vel ʒij (4.0–8.0).
Potassii bromidi . . . . ʒiij (12.0).—M.
Ft. in chart No. x.
S.—One every thirty minutes till relieved.

Or, when the caffeine in the first prescription causes nervousness,

℞.—Antipyrini . . . . ʒj vel ʒij (4.0–8.0).
Caffeinæ citratis . . . . gr. x (0.65).
Potassii bromidi . . . . ʒiij (12.0).—M.
Ft. in chart No. x.
S.—One as above.

In any one of these prescriptions acetanilid or phenacetin may be substituted for the antipyrin.

A very effective remedy in some cases of neuralgia of the fifth nerve is croton chloral in from 5- to 20-grain (0.3–1.3) doses in pills of 5 grains (0.3) each.

In some cases of anæmic neuralgia of the head nitrite-of-amyl inhalations have proved useful, probably by reason of the cephalic flushing produced by this drug.

A very large number of local applications have been used with success in obstinate neuralgias and other cases not so difficult of cure. Cocaine cannot be applied, as it does not penetrate the skin, but relief can sometimes be obtained by the local use of the oleate of aconitine painted over the spot if it be limited in area. Much of this alkaloid cannot be applied, lest poisoning by absorption occur.

Where the nerve is very superficial it can often be treated by cold with great success. This is accomplished by freezing the parts with an ether, chloride of methyl, or rhigolene spray, or by the application of a small package of finely-chopped ice and salt to the part. Within the last few years the treatment of neuralgia by *kataphoresis* (see Part III.) has come into prominence, and consists in the use of some local anæsthetic, such as chloroform, which is applied over the part on a small piece of lint, and a galvanic current used through the pledget which is attached to the positive pole. Under these circumstances the anæsthetic passes through the skin and affects the nerve.

A very useful local injection in localized neuralgia is 1/5 to 1/4 of a grain (0.016) of morphine, but the danger of beginning the morphine habit is to be remembered when treating chronic cases. Sometimes acupuncture (see Part III.) is of service, and the surgeon may be called upon to stretch the nerve or to do a neurectomy.

There still remains to be considered a form of neuralgia generally known as *migraine*. This affection is very severe in its manifestations, and is often most obstinate in yielding to treatment. Commonly it is associated with eye-strain or cerebral disease or other similar cause, and these must be removed before a cure is entirely effected. The best treatment of most of these attacks is the use of 20 drops (1.3) of the tincture of cannabis indica every hour if a good preparation can be had, or by the use of 1/4 to 1/2 grain (0.016–0.30) of the solid extract every two hours, accompanied by 10 to 20 drops (0.65–1.3) of tincture of gelsemium. (See article on Headache.)

NIPPLES (SORE).

Whenever the nipples become sore, so that it is impossible for the mother to allow the child to nurse, a solution of cocaine of the strength of 4 grains to the ounce (0.2 : 32.0) should be applied to the part, and washed off carefully just before the child sucks. Following the nursing, a solution of boric acid, of the strength of 20 grains to the ounce (1.3 : 32.0) of water or mucilage of acacia, may be used over the part, the nipple being thoroughly dried beforehand. Where the fissures are deep and slow to heal the tip of a stick of silver nitrate may be applied to them with advantage. Some practitioners employ tincture of benzoin over the inflamed part, and glycerite of tannin is often of value. Cleanliness, dryness, and care of the breast previous to parturition do much toward preventing the condition.

Sometimes it is necessary to use a breast-pump or nipple-shield before a cure can be effected.

OBESITY.

Whenever an excess of fat accumulates in the body, various discomforts, both mental and physical, arise, and in addition the normal functions of all the parts are so disturbed or interfered with that the continuance of health is often impossible. In many cases the deposition of fat about the heart or between its fibres results in serious symptoms; and breathlessness on exertion is produced by the obstruction which is offered to the free movements of the diaphragm by masses of omental fat, aided by the fact that the great weight and bulk of the body requires severe muscular effort. It is worthy of note, also, that a layer of fat over the body increases the vascular surface very greatly, and in consequence gives the heart the labor of supplying a larger number of blood-vessels.

The causes of obesity are numerous. In many families there is an inherited tendency, while in others only certain individuals are affected. These persons are fat because their systems naturally tend to the deposit of obese materials, in the same way that the members of one family have large bones, while those of another have small bones. The etiology of obesity, outside of the causes just named, are very numerous, but the chief one is over-indulgence in food.

Just at this point it is not out of place to state exactly what over-indulgence in food means. Every individual is a law unto himself in regard to the amount of food which is consumed and ingested. One often sees large, powerful, wiry men, who eat little, sit beside others, not so powerful or large, who eat excessively, and who apparently do not suffer from indigestion in consequence. Neither of these two groups becomes excessively fat, because one represents a grate which burns its fuel so that there is no waste, while the other resembles a grate in which there is always a residue of unburnt coal, which is cast out with the ashes as effete matter. As different engines of the same build require varying amounts of coal, so do different men assimilate different amounts of food. No stated amount of food can be set down as a man's daily portion until his case is carefully studied, but it is important to remember that the quantity of food is generally in direct ratio to the severity of the toil, and that a man who loafs about a club or " takes life easily " often eats more than a day-laborer—of far richer foods, too—and wonders why he gets stout. In nearly every case of obesity not dependent upon gross disorder of the trophic nerves over-indulgence in food is the cause. To some this may seem absurd, and the patient will say that he eats just enough to keep him from feeling empty between meals; but this does not alter the case in the least. The proper amount of food for a man is not what his appetite or gastric viscus calls for, but what his system needs. To this further reference will be made when considering the diet for obesity, found below.

The very presence of fat aids in the deposition of it, for, by acting as a non-conducting pad all over the body, it prevents the dissipation of heat, and so decreases the combustion of those substances which, when not used for the manufacture of heat, are deposited as fat. Again, we nearly always find that obese persons take alcohol with their food, thereby increasing the fat in their bodies; for, finding that they cannot digest all the substances which greediness makes them swallow, they take alcohol to stimulate their digestive apparatus to increased efforts and assimilation. Further than this, alcohol adds force to the body, and preserves the tissues by substituting itself for food in the oxidizing processes.

We find, therefore, that three great causes are active in producing corpulence in many cases—namely, heredity, over-indulgence in food, and lack of exercise, which is one of the means by which over-indulgence is produced; *i. e.* less exercise, less food needed, but often more eaten.

The treatment of corpulence rests solely upon the conditions named. In all instances the diet is the important point for the bestowal of care. Reference has already been made to the fact that the needs of the system are the criterion by which we judge the amount of food necessary to each case, not the sensations in the stomach. The use of coca by the natives of South America enables them to withstand hunger and privation, not because it gives tissue to the body, but because it paralyzes the sensory nerves in the stomach and relieves the sensation of hollowness or weakness which we are accustomed to overcome in this country, in the absence of food, by tightening our belts. Every one who has undergone severe mental or physical labor and missed a regular meal will remember that about the usual hour for the meal his sensation of emptiness may amount to nausea and distress, but the hour once passed he feels as strong as before until by prolonged toil he so exhausts his powers that the system forces him to eat, not so much from hunger as from exhaustion. To understand this clearly, we must recollect that the system keeps its shares of force in the same way as a careful speculator keeps his shares of stock—namely, one part in active use for speculation, the other half for reserve in case of need. In health the stomach begins to "feel hungry" as soon as the speculative shares of force are nearly used, in order to cause the ingestion of more food and to preserve the "sinking fund" intact. It becomes evident, therefore, that the mere presence of hunger is purely a symptom, not an indication of the absolute necessity of food, for, if it were, the consumptive would be notorious for his appetite, instead of being noteworthy for his anorexia.

The food of the patient suffering from obesity is to be cut down gradually, and the character of it arranged so that, though its bulk be great, its nutritive properties are small. Beef and other meats are concentrated foods containing much nourishment in a small space, while lettuce, spinach, cabbage, and nearly all vegetables, except roots or tubers, contain a large amount of fibre useless to the body. By the use of a carefully arranged vegetable diet in obesity we cut down the actual amount of food absorbed, and by its bulk keep the stomach so busy at sifting the nutritious from the non-nutritious materials that hunger is not felt, because another meal-time is reached almost before the food of the first is assimilated. We find, therefore, that the diet for the reduction of corpulence should consist chiefly of bulky vegetables, but not too exclusively of any one article or set of articles. Heretofore it has been thought that proteids (meats, eggs, etc.) should be used to take the place of all hydrocarbons or carbohydrates (fats, starches, and sugars), but this is not physiologically correct, as both forms of food are always needed for health, and it has been found that proteids may be converted into fats in the body.

The following bill of fare will be found of service in the treatment of obesity:

Breakfast: One or two cups of coffee or tea, without milk or sugar, but sweetened with a fraction of a grain of saccharin. 3 ounces of toasted or ordinary white bread or 6 ounces of bran bread. Enough butter may be used to make the bread palatable—not more than 1 ounce. Sliced raw tomatoes with vinegar or cooked tomatoes without any sugar or fats. This diet may be varied by the use of salt or fresh fish either at breakfast or at dinner.

Noon meal (dinner): One soup-plate of bouillon, consommé, Julienne, or other thin soup, or Liebig's or Mosquera's beef jelly, followed by one piece of the white meat of any form of fowl or a small bird. Sometimes a small piece, the size of one's hand, of rare beef or mutton, but no fat, may be allowed, and this should be accompanied by string-beans, celery, stewed or raw, spinach, kale, cabbage, beans, asparagus, leeks, and young onions. Following this, lettuce with vinegar and a little olive oil (to make a French dressing), a cup of black coffee or one of tea, and a little acid fruit such as some sour grapes, tamarinds, and sour oranges or lemons, may be taken, and followed by a cigar or cigarette.

Supper should consist of one or two soft-boiled eggs, which may also be poached, but not fried, a few ounces of bran bread, some salad and fruit, and perhaps a glass or two of light, dry (not sweet) wine, if the patient is accustomed to its use.

Before going to bed, to avoid discomfort from a sensation of hunger during the night, the patient may take a meal of panada or soak Graham or bran crackers or biscuits in water and flavor the mass with salt and pepper.

The reduction of diet is generally best accomplished slowly, and should be accompanied by measures devoted to the utilization of the fat present for the support of the body. Thus the patient should not be too heavily clad, either day or night, should resort to exercise, daily becoming more severe, and should not drink freely of water, unless sweating is established sufficiently freely to prevent the accumulation of the liquid in the vessels and tissues.

Very often a cold bath will, by its dissipation of heat, cause destruction of fat, which will be burnt up in the body in the manufacture of heat-units to maintain the temperature; and if the patient is not too anæmic and stands this exposure to cold well, the bath should be repeated each day or a Turkish bath used instead.

The bowels should be kept active by laxative fruits or purges, but if liquids taken in drink are not eliminated rapidly, saline purges are useful, since, if the blood-vessels are engorged, the circulation in the capillaries is slow and a deposit of fat is apt to result.

Where proper exercise is impossible the rest cure, with massage, electricity, passive exertion, and an absolute skimmed-milk diet, may be resorted to, particularly in those persons known as "fat anæmics," who have not enough red corpuscles in their blood to carry sufficient oxygen to the tissues to complete oxidation.

PERICARDITIS.

Inflammation of the pericardial sac is a frequent occurrence and requires prompt treatment. If the case be sthenic and is seen early, five to ten leeches should be placed over the præcordium, and at the same time sufficiently large doses of veratrum viride or aconite resorted to to depress the circulation, and by the dilatation of the blood-vessels elsewhere to draw off the blood from the inflamed area. To prevent the outpouring of a plastic exudate capable of undergoing organization and forming adhesions, calomel should be given in ½-grain (0.03) doses every hour, combined with enough opium to prevent purgation. An ice-bag placed over the præcordium not only relieves the pain, quiets the circulation, and reduces the temperature, but also acts favorably in modifying the severity of the inflammation.

Where the case passes from the acute stage of inflammation to that in which effusion takes place, the treatment changes at once, and becomes supportive if the system shows signs of failure. The friction-sounds of the first stage are now lost, and the heart-sounds may be feeble or muffled in tone by reason of the effusion present. Digitalis, alcohol, or caffeine may be used if the heart shows signs of failure, but when digitalis is used its influence should be carefully watched, since the employment of this drug produces a very full diastole or dilatation of the ventricles, and these are already cramped for space in which to dilate by reason of the exudate which has entered the pericardial sac. If the effusion is sufficient to endanger life, it should be tapped and aspirated away very gradually. Often it is best to use a long needle attached to a hypodermic syringe in order to be sure that there is fluid. The best place for making the puncture is the fourth or fifth intercostal space, very close to the left edge of the sternum. Should pus be present, free drainage must be gradually established. In other instances, if the patient is strong, it is only necessary to administer hydragogue purges, such as jalap (20 grains [1.3] of the compound jalap powder), or elaterium ⅙ grain (0.01), or a saline purgative in concentrated form, before breakfast. Often a blister over the præcordium is of service.

PERITONITIS (ACUTE).

The views of the best minds in the medical profession concerning the treatment of peritonitis have changed radically in the last ten years, chiefly through the advances made in abdominal surgery and bacteriological research. These opportunities for study have shown that peritonitis never arises as a strictly primary condition, but is due in every case to the infection of the peritoneum by micro-organisms, benign or malign, which are originally found in the intestines or other portions of the abdominal viscera. Even when peritonitis follows directly upon injury, the actual cause of the pathological process is the escape of micro-organisms through the devitalized wall of the intestine, and the severity of the attacks depends in turn upon the vital resistance of the patient, the degree of infection, and the rapidity with which a plastic exudate is thrown out to encapsulate the inflamed area.

It is not possible in this short article to discuss the facts now known in regard to the etiology and pathology of acute peritonitis. Suffice it to state, one of the germs found normally as a benign inhabitant of the intestine becomes at once, on entrance into the peritoneal cavity, malignant and capable of producing rapidly-fatal peritonitis. Nor is actual rupture of the bowel or appendix vermiformis necessary for this infection, since it has been shown that this germ, the bacillus coli communis, rapidly migrates through the bowel-wall as soon as it becomes inflamed or congested in all its coats. Streptococci and staphylococci, finding access to this cavity, also produce violent inflammation. It has been found that the peritoneum will destroy many infecting germs in the healthy man if its vitality is not impaired, but if it *is* impaired a mild infection starts up severe inflammation.

Having learned, then, that acute peritonitis is always secondary to some local cause or to some general infection, the first thing for the therapeutist to do, being called in to a case of this disease, is to determine what the provoking agent is, in order that his treatment may be directed against the cause rather than the effect. This cause is now known, in the great majority of cases, to be Appendicitis (which, see), the inflammatory process being spread by infection from this source. In women it is not uncommonly due to more or less obscure pelvic disease, or, again, it may arise from abscess and other severe diseases of the liver, spleen, pancreas, or stomach. Finally, it should never be forgotten that intestinal obstruction is a frequent cause of peritonitis. The physician may rest assured that if he cannot find the provoking cause, it is his own fault, and not that the case is purely idiopathic.

Having found the cause, treatment is of course to be at once instituted, and is medical or surgical—more commonly the latter than the former, since nearly all the provoking causes of this disease are at most only palliated by medicinal treatment, while they can sometimes be removed by surgical interference. Fortunately for those who can only obtain medicinal treatment, nature does much to aid in producing a cure in many cases by limiting the disease through its localization by walls of lymph, so that many cases of peritonitis recover without active medicinal or surgical care. In the pelvis this localization of the process is very apt to take place unless the infection follow childbirth, when septic diffuse peritonitis may arise, which is nearly always fatal.

If the trouble arise in the appendix vermiformis, this condition may be treated in its early stages by the means suggested in the article on Appendicitis, but at the very first sign of the spread of the inflammation, or of its becoming locally very severe, or of general systemic disturbance, the surgeon must be called in. The difficulty is that in many cases requiring operation, the operation is performed too late through the hesitancy of the patient, his friends, the physician, or even of the operator himself. If the *local* trouble does not seem to be spreading and the patient's general condition is favorable, operation should be postponed indefinitely or until a state of quiescence is reached, when the prospects of recovery from operative interference are better. If there is reason to believe that an abscess has ruptured into the peritoneal cavity, or if perforation of the bowel is followed by severe general symptoms of widespread peritoneal difficulty, operation should be resorted to at once.

In deciding the question, however, as to whether a case of peritonitis requires surgical interference, the physician at the present time is in an unfortunate position. There can be no doubt that there are many records in medicine which prove most conclusively that lives have been saved through operative interference which would have been undoubtedly lost had the surgeon not come to the rescue. On the other hand, there are cases in which a fatal result has followed an operation, and in which the physician has bitterly reproached himself that he consented to surgical interference, for as he looks back over the case he perceives that the operation has distinctly aided in causing the loss of life. At the present time each case must be decided upon its individual merits, and the physician or surgeon in giving advice to the family in regard to a well-developed case of peritonitis should always be careful to let them understand distinctly that the condition of the patient is most alarming, and the chances of life poor whether the treatment be medical or surgical, since in many instances neither form of remedial measure can possibly produce good results. In other words, the relatives should clearly understand that whether medicinal measures or surgical procedures are resorted to, the patient has only a fighting chance.

The following case illustrates the value of surgical interference in peritonitis:

M—— was taken ill at twelve midnight, with violent pain in the belly, and was seen by the writer the following evening at eight o'clock. At this time all the physical signs of a widely-diffused peritonitis were present. The belly was hard and board-like, the pulse was exceedingly rapid, the respirations fifty-six, and there was great pain. Careful physical examination of the belly and a study of the patient's history failed to reveal any cause near or remote for the attack, he having been in perfect health up to the time at which the pain began. After consultation with an eminent surgeon it was decided that his condition was so pressing that death under medicinal treatment was assured, and that, while operative interference offered but a faint chance of success, it was the only measure which could be resorted to. Accordingly, at twelve o'clock that night, just twenty-four hours after the pain began, the patient was operated upon, the incision being made in the median line for the purpose of exploring the belly, with the hope that an exciting cause for the attack might be found. On opening the belly it was found that acute intestinal obstruction had taken place through the bowel being twisted over an old inflammatory band. After this obstruction had been reduced the appendix was examined, and found to be in a condition of acute inflammation, and for this reason it was removed. It was noted that the peritoneal surfaces of the intestines and of the abdominal wall was intensely hyperæmic and red and lacking in their normal appearance. The operation lasted an hour and a half, and the patient recovered after a desperate struggle for life which lasted for weeks, during which time his attendants several times gave up all hope of his recovery. Had no operation been permitted, death would certainly have resulted from the intestinal obstruction if not from the appendicitis, and had the median incision not been made, but the appendix alone sought for by a lateral incision, the obstruction would have been overlooked, and the death recorded as one due to general peritonitis following appendicitis for which an operation had been performed unsuccessfully.

On the other hand, the writer saw a case in which the conditions before operation were apparently identical with that just named, in which appendicitis and obstruction were discovered at the operation, and in which death took place as early or earlier than it would have occurred had operative interference not been resorted to. These two cases are mentioned for the purpose of emphasizing the fact that a definite prognosis as to the results of treatment, either surgical or medicinal, in peritonitis is not possible.

Aside from the surgical treatment, which is an absolute essential in many cases of peritonitis, we have at hand medicinal methods which are of some value early in the attack and where operation is refused or considered inadvisable. The first of these is the use of opium, given until the pain is partly removed and the respirations decreased to twelve or fourteen per minute. The patient should never be so narcotized as to have no pain on abdominal palpation or be unable to answer questions. On the other hand, it should be remembered that cases of peritonitis bear large doses of opium without effect. The dose should be pushed till the desired effect is obtained, and not be measured in grains. Cases are on record in which many hundred grains of opium have been given in a few days, with recovery as a result.

For many years physicians of repute have regarded mercury as the drug above all others capable of modifying inflammations of serous membranes, particularly if combined with opium. Half-grain doses of calomel may be used every hour for twenty-four hours. An ice-bag or a turpentine stupe may be put over the the area originating the trouble. If the case is very sthenic, leeches may be used on the belly, but this is not advisable in most cases, as the patient may later need the blood to preserve his strength. Should vomiting be a pressing symptom, it is best controlled by the use of two grains of acetanilid every two or three hours with brandy and ice. Medication is best carried out by the hypodermic needle or the rectal injection. The thirst in many cases of peritonitis is excessive, and ought to be relieved by giving small pieces of ice with or without a little white of egg poured over it. Even small amounts of water are not to be forbidden, since the vomiting is reflex, and the water allows the vomiting to take the place of the more exhausting retching. If collapse is threatened, the best remedy is probably the extract of hyoscyamus by the rectum in injection or suppository, since this drug, while it contracts the vessels and soothes the nervous system, does not tend to produce disagreeable symptoms as does belladonna.

The question of the use of purgatives in cases of peritonitis has been much discussed. The writer believes that in cases of peritonitis following operation, where the operator knows the intestine is intact, saline purgatives, such as teaspoonful doses of a saturated solution of magnesium sulphate every ten or fifteen minutes, may be used in many cases with good effects; but if there is any possibility of the peritonitis being caused by perforation or obstruction, their use is absolutely contraindicated, since if used the contents of the gut may be washed into the peritoneal cavity or the obstruction be rendered more complete. The saline purgative not only empties the bowel, but in addition, by the free watery flow produced, depletes the inflamed peritoneum. When there seems to be a probability that the pain may be due to the ingestion of bad food, and signs of perforation are absent, purgatives may be used to remove the offending articles. Should the patient be feeble, purgation is contraindicated.

The tympanitis, which may be a prominent symptom, may be relieved in some cases by the use of the rectal tube or of injections into the bowel of milk of asafœtida or turpentine emulsion.

This book is not the place for the consideration of the surgical procedures to be followed, but it may be stated that in septic peritonitis in all cases it is a question of operation with probable death, or no operation with certain death. In obscure cases of general peritonitis, where the cause of the disease cannot be found by ordinary methods of diagnosis, the writer believes that exploratory incision should be done, and after the cause is removed the belly-cavity well washed out with hot normal saline solution, and drainage-tube or gauze left in for at least twenty-four hours.

PERITONITIS (CHRONIC).

Chronic peritonitis is very apt to be circumscribed and to exist in connection with chronic appendicular trouble or in females in connection with diseases of the organs of generation. The most diffuse and curable form of the disease is that known as tubercular peritonitis, in which cures have been safely reached through abdominal incision with or without drainage or the dusting in of iodoform. Of all forms of organic disease affecting the abdominal area and of a chronic type, none offer such results to the physician and surgeon as does this, and operation ought always to be advised and urged upon the patient most strenuously. Care should be taken, however, to separate the subacute or chronic process, termed tubercular peritonitis, from the malignant and acute form called tuberculosis of the peritoneum, which is often only a manifestation of a general infection.

PERNICIOUS MALARIAL FEVER.

This is one of the most acutely dangerous diseases known to man if it be fully developed, and requires the greatest activity and skill on the part of the physician, who may be called upon to treat a large number of widely varying symptoms, all of a pressing nature, at one and the same time. The chief indication is for the use of quinine in its most soluble forms, in solution and in large doses, which may amount to 60 or 100 grains (4.0 or 7.0), by the mouth, by the bowel, and hypodermically.

The manner in which quinine acts in malarial poisoning is now generally conceded to depend upon its influence over the malarial germ of Laveran, which has been so well studied in America by Osler and Councilman. All the students of the subject have found that at least some of these bodies are made inactive and disappear under the influence of the drug, and we have at last obtained a knowledge as to the manner in which quinine does good, which in its absence was a constant opprobrium to scientific medicine. The saying that "As soon as the physiologist and pathologist tell the therapeutist what disease is, the latter will tell how his remedies do good," is very well exemplified by the use of quinine in malaria and the present well-founded scientific reasons for its employment. (See Intermittent and Remittent Fevers.)

PLEURITIS, OR PLEURISY.

It is to be remembered that an inflammation of the pleura is in many ways identical with inflammatory processes elsewhere. The treatment of this disease in its early stages is therefore identical with other inflammatory diseases, or, in other words, the use of venesection, or, better still, of tincture of veratrum viride or aconite, to bleed the man into his own blood-vessels, is to be resorted to if the patient is seen in the earliest stages and is strong and full-blooded. The use of blisters or cups at this time does little good and gives unnecessary pain.

When the pain from the pleurisy is excessive and the movements of respiration greatly increase the discomfort, strapping the chest-wall may be resorted to. This is done for the purpose of immobilizing the chest. The straps should consist of adhesive plaster, two and a half inches wide, and should be long enough to reach from the middle line of the vertebræ to the sternum or a little beyond its middle line. They should be applied tightly during expiration, slightly overlapping one another at a right angle to the spine, and not in the line of the ribs.

The old idea that pleurisy was usually due to cold rather than to an infecting micro-organism led to the enveloping of the chest in poultices. These soil the clothing, speedily get cold, and are very uncomfortable. They have been supplanted almost entirely by the cotton jacket, which is much better. It consists of one or two thicknesses of carded cotton basted inside a thin undershirt, as fur is placed in a fur-lined coat. On the outside of the shirt oil-silk should be basted. By using this we envelop the chest in a warm poultice, because the heat of the body keeps the cotton at the proper temperature, while the oil-silk, by preventing evaporation of the moisture exhaled from the skin, soon causes the cotton to be moist as well as warm. Even the cotton jacket is losing its popularity, as the fever of the patient makes a hot jacket almost unbearable and it does very little real good. Further, its removal is very apt to result in a chill.

When the second stage of pleurisy, or the stage of effusion, is reached, other lines of treatment are needed. The cardiac sedatives have been stopped as soon as the quieting of the circulation, the lessening of pain, and the absence of a friction-sound denote the passage of the case from the first stage to the second. If the pulse becomes weak and the system is depressed, stimulants in the form of alcohol or digitalis are needed, and special care must be devoted to the condition of the exudation in the pleural space. If the effusion is sufficiently large to cause marked dyspnœa on exertion, or reaches to the third interspace anteriorly, and is not readily removed by the administration of salicylic acid in the dose of 1 to 2 drachms (4.0–8.0) a day, or saline purges given at the proper time in concentrated form, or if it is not taken up by the vessels after jalap or elaterium is used, then resort must be had to aspiration of the liquid by the proper apparatus. This operation should be done at once without the use of drugs if the dyspnœa is urgent. The physical signs at this time, it will be remembered, consist in flatness on percussion over the lower portions of the chest, which area of flatness generally varies with the change in the position of the patient from the erect to the recumbent position, unless the effusion is sacculated. Blowing or bronchial breathing at the apex of the lung when this organ is compressed upward by the fluid beneath it is often heard. If the effusion is on the right side, the apex beat of the heart is apt to be displaced to the left. If it is on the left side, there is obliteration of Traube's semilunar space, which is a spot at about the level of the sixth and seventh ribs anteriorly below the nipple, where there is usually a tympanitic note on percussion. During this stage of effusion blisters have been largely used in aiding in the absorption of the liquid which is present.

PLEURODYNIA.

This condition, being one of intercostal neuralgia, should be treated according to the directions given under the headings of Neuralgia and Counter-irritation.

PNEUMONIA.

Pneumonia is a term loosely applied to two very different forms of disease—namely, that acute infectious process due to an infection by the *micrococcus lanceolatus* and called croupous pneumonia, and that form following as a rule some other disease which has exhausted the patient's strength and due in some cases to various forms of infection, namely, catarrhal pneumonia. These two distinct diseases have been confused by the common term pneumonia, and yet are very different conditions as to their pathology and treatment.

Croupous Pneumonia.

Croupous pneumonia usually attacks the strong and hearty rather than the feeble and exhausted, but both types of cases may be affected. The treatment can be divided, when we study it, into that devoted to the stage of onset, the stage of consolidation, and the stage of absorption of the exudate and convalescence; and it will be governed by the state of the patient's pulse, the sounds of his heart, and his general condition as to strength, as well as the degree of respiratory embarrassment which is present. There can be no routine treatment of croupous pneumonia; each case must be a law to itself, and there is no such thing as the depletant treatment to be advocated on the one hand, or the stimulant treatment to be lauded on the other. Further than this, it must be remembered that as croupous pneumonia is an acute infectious disease the patient may die not from pulmonary consolidation or cardiac distention, but from the malignancy of the infection. One man with an entire lung consolidated may have slight evidences of general infection or toxæmia, another with a small area of lung involved may be overwhelmed by toxæmia within a few hours. For this and other reasons we can divide all cases of croupous pneumonia into three groups—those that are doomed to death by the malignancy of the infection, those that are but slightly ill by reason of mild infection, and those who between these two extremes of severity need careful medical aid to accomplish recovery. The first class die do what we will, the second class get well almost without help, the third need all the help possible to survive. It is to this last class that our treatment must be chiefly directed.

In the very earliest stages of the disease occurring in a healthy, sthenic individual who has been seized with a chill followed by fever and a bounding, angry pulse, with marked anxiety and nervous excitement, it is proper to freely bleed from a vein in the arm to the extent of a pint (see Part III.), or in its stead to use veratrum viride or aconite to relax the systemic blood-vessels and "bleed him into his own vessels" by making it easier for the blood to pass into the general arterial system than into the lung which is inflamed. These sedative drugs also quiet the excited heart and prevent it from pumping so much blood into the engorged lung. A hot foot-bath at this time will also tend to relieve thoracic congestion. If veratrum viride or aconite are used they should be given in minim doses of the tincture every half-hour till five or ten doses have been used or until the patient's pulse becomes less angry and his skin becomes moist. Veratrum viride is the best drug of the two for adults. If violent pain in the chest is present it is to be relieved by small doses of morphine or Dover's powder. This treatment is devoted to an attempt to limit the degree of inflammatory action as far as possible. It may be aided, if it is thought wise, by wet cups over the engorged lung.

The depressant treatment of croupous pneumonia is, however, limited in its application to the very beginning of the malady and to those persons who have a bounding circulation. It is absolutely contraindicated after consolidation has taken place or if the patient is feeble. Because of the fact that its usefulness is confined to this early stage it cannot be employed in many cases, because the physician is not called till after this stage has passed by. Its use in a case with a feeble pulse or in one who is adynamic or feeble is absolutely contraindicated.

In the majority of cases the physician is called after the consolidation has occurred, and he must now be a watchman all the time and a therapeutist only when treatment is actually needed. Every man who is suffering from pneumonia does not need active treatment. A certain number of cases get well without treatment and do so sooner than if meddlesome therapeutics hinders them. The treatment usually necessary is to combat fever, if it becomes excessive, to support the heart if it seems feeble or congested, to keep the kidneys in a state of active secretion, and to see that constipation is relieved.

In the treatment of the fever the physician should remember that it is not to be regarded as a dangerous symptom unless it rises to 103° and remains at this point for some hours, for in a febrile disease running a short course fever is not only not harmful, but there is reason to believe that when present to a moderate degree it is actually beneficial.[1] When the fever does rise to a point above 103° it should be reduced by sponging with cold water, active friction being used at the same time. (See Part III., on Cold.) There is absolutely no danger of the patient "taking more cold," although this is generally doubted by the laity. If the fever has a tendency to be excessive and if the heart's action is tumultuous an ice-bag may be placed over the heart, and this will be particularly useful if, as is often the case, there is a tendency to pericarditis. If it is desired to apply cold over a greater area of the chest than the præcordium an ice-jacket may be employed, but it possesses the disadvantage of being a wet application, do what we will to protect the bedding. This ice-jacket is to be made of cracked ice and sawdust mixed and sewed up tight in an oil-silk covering which is basted to an undershirt to keep its shape. This treatment has been said to greatly reduce the inflammatory process in the lung, but of this there are grave doubts.

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[1] See article on "The Rôle of Fever in the Modification of Disease," in the *Therapeutic Gazette* for February, 1896.

The use of antipyretic drugs is not good practice. They tend to depress the heart, to relax the blood-vessels, and apparently render the patient more susceptible to his infection. Sponging will generally control the fever if it is properly employed, or, if it fails, then a cold bath may be required if the fever is really very excessive. (See Cold, in Part III.)

For the support of the heart we may employ several circulatory stimulants. If the patient is a feeble case with lack of vitality and relaxation of his muscles, then alcohol in the form of a good whiskey or brandy given in water after food every three or four hours in the dose of from half an ounce to an ounce is useful. Sometimes more than this must be given, particularly if the patient has been accustomed to the use of the drug. In other cases less is needed. For the laboring heart with almost empty arteries no drug compares with digitalis, and if the skin is moist or the blood-vessels relaxed, so that the pulse is gaseous, then belladonna should be combined with it. The writer usually gives 5 drops (0.3) of the tincture of digitalis every eight hours, with 5 drops (0.3) of tincture of belladonna every four hours. (See Digitalis and Belladonna.) If necessary, both of these drugs may be given in larger dose, but usually these doses are sufficient. If the fever is very high the digitalis will have to be supplanted by the alcoholic stimulants or strychnine for a few doses. The question as to whether the patient's pulse is of the proper strength is one of importance: very often the quiet pulse of a patient lying in bed will be taken by the inexperienced as an evidence of true cardiac feebleness, when if the physician feels his own pulse he will be surprised to find it no stronger than that of his patient. A feeble apex beat, a feeble second sound at the second right costal cartilage (aortic valve) and an accentuated second sound at the second left costal cartilage (pulmonary valve) will reveal the fact that active stimulation is needed, for the weak apex beat and the soft second (aortic) sound, show that the heart is feeble and the arterial walls relaxed, and this means a low arterial pressure. Further, the accentuated second sound on the right side indicates pulmonary congestion and a tendency to failure of the right side of the heart from obstruction to the flow of blood in the lungs.

Should the action of the heart become labored, the jugular veins distended and pulsating, and the radial pulse weak, while the face is cyanotic, then free venesection (Part III.) is to be practised. It will often save an apparently desperate case. Digitalis in the presence of this condition is not rapid enough in its effects. Strychnine should be given in full dose hypodermically, $\frac{1}{20}-\frac{1}{10}$ of a grain (0.003–0.006), and with it, if the skin is moist or sweating, $\frac{1}{150}$ of a grain of atropine (0.0004), and both these drugs should be repeated in an hour if needed. At the same time it is well to give ½ drachm (2.0) of aromatic spirit of ammonia every two hours in cold water or 1 drachm (4.0) of Hoffman's anodyne in cold water every hour. Oxygen inhalations may be used at this time with benefit, particularly if cyanosis is marked. (See Oxygen.)

Should crisis come on at this time, active supportant treatment, such as that just described, will be needed. Many patients die in crisis for the want of active stimulation.

The secretion of the kidneys is best maintained by the use of some alkaline diuretic, such as sweet spirit of nitre and citrate of potassium, and if necessary a little gin may be given to support the heart and aid in maintaining renal activity.

Having detailed this treatment of the second stage, that for the third stage is to be considered. For the thorough understanding of this we should remember that this stage consists in the breaking down or resolution of the exudations and in their absorption and expulsion from the chest.

At this time the entire diseased area is crowded with secretions which have been formed, dead epithelial cells, and all the morbid substances which have accumulated. The local surfaces are depressed by the reaction following upon the excitement of inflammation, and their tone is below par. The object of the physician must be to stimulate these areas so that they may throw off the old and take on a new functional activity, and for this purpose remedies are to be used which will soften deposits and stimulate depressed vesicles and bronchial tubes.

By far the most valuable class of drugs to be here employed are those which will increase the secretion from mucous membranes without acting as cardiac depressants. Under the article on Bronchitis the action of these drugs will be found more thoroughly explained, but it will suffice to point out, at this time, the method of their administration.

First and foremost stands the chloride of ammonium, a drug whose elimination takes place largely through the lungs, and which acts most happily in aiding in the loosening of the cough and secretions. Its only disadvantage is its salty taste, which in many cases renders it disagreeable to the patient, while its irritant properties may disorder the action of the stomach, although if this organ is depressed and atonic this drug often improves its condition. This drug may be given in compressed pills, or, what is far better, in such a mixture as here follows:

℞.—Ammonii chloridi	ʒij (8.0).
Extract. glycyrrhizæ fl.	ʒij (8.0).
Aquæ dest.	f℥iij (96.0).—M.

S.—Teaspoonful (4.0) in water every four hours during the day.

If the cough be in excess of the expectoration—that is, if the cough often fails to bring up phlegm and is due to tickling or irritation—it may be relieved by the addition of a little morphine to this mixture, as follows:

℞.—Morphinæ sulph.	gr. j vel gr. ij (0.05-0.1).
Ammonii chloridi	ʒij (8.0).
Extract. glycyrrhizæ fl.	ʒiv (16.0).
Aquæ dest.	℥vj (192.0).—M.

S.—Dessertspoonful (8.0) every four hours.

If much more morphine than this is used, it will tend to stop secretion.

When the chloride of ammonium fails to act favorably, the carbonate may be called into use for its local and circulatory action, and, in addition, the bromide of ammonium may be employed to allay the cough if morphine cannot be used. The following prescription is valuable:

℞.—Ammonii chloridi	ʒj (4.0).
Ammonii bromidi	ʒj (4.0).
Ammonii carbonat.	ʒj (4.0).
Extract. glycyrrhizæ fl.	ʒiij (12.0).
Aquæ dest.	f℥vj (192.0).—M.

S.—Dessertspoonful (8.0) every four hours.

(For other remedies for this stage see Bronchitis.)

Nutritious broths, milk, and, if necessary, predigested foods, should be given with the regularity with which medicine would be given from the beginning to the end of the attack.

Catarrhal Pneumonia.

The main difference in the treatment of Catarrhal Pneumonia in distinction from the treatment of croupous pneumonia lies in the fact that first, last, and all the time the treatment is to be stimulant in its character if any treatment other than rest in bed is resorted to. Catarrhal pneumonia usually arises out of an acute bronchitis or is superimposed upon some exhausting disease which has sapped the vitality. Toward its close expectorants are even more useful than in croupous pneumonia, and every care should be taken that the catarrhal process does not pass by insidious degrees into a hidden tuberculosis. All cases in which recovery is abnormally slow should be suspected of tubercular infection.

PRURITUS.

Itching of the skin or mucous membranes about the openings of the body is a very common state, and while it may be dependent upon local causes, such as lice or fleas, it more commonly is due to some systemic condition, such as debility, diabetes, gout, or renal disease, or other similar causes. The treatment consists, first, in the removal of the cause, and, next, in the local treatment of the condition. There is generally no redness or eruption, except that due to scratching.

Internally, arsenic, quinine, bitter tonics, cod-liver oil, alkaline diuretics, or mineral waters are useful in debilitated cases, and an avoidance of condiments, such as mustard or pepper, is needful if the disease affects the mouth of the urethra or vagina.

The local treatment of pruritus consists in the use of lotions, salves, or ointments made up of various constituents, a number of which are capable of acting as local anæsthetics. Very often, bathing the parts with 1 drachm of bicarbonate of sodium or of borax to a pint of cold water gives relief temporarily, or the following formulæ will be of service:

℞.—Acidi carbolici . . . . fʒj vel fʒij (4.0–8.0).
Aquæ dest. . . . . q. s. ad Oj (500 cc.).—M.
S.—Apply as a lotion several times a day.

Or,

℞.—Liquor carbon. detergen.[1] . . . . fʒij (8.0).
Aquæ . . . . q. s. ad Oj (500 cc.).—M.
S.—Apply as a lotion.

Or an ointment made as follows is serviceable:

℞.—Acidi carbolici . . . . gtt. v vel xx (0.3–1.3).
Adipis benzoinatus . . . . . . ℥j (32.0).
Petrolati . . . . ʒj (4.0).—M.
S.—Apply as an ointment.

In other cases 10 to 20 minims (0.65–1.3) of chloroform may be used in place of the carbolic acid.

Cocaine may be painted over the parts, but it should rarely be used in ointment, as fats prevent its acting effectively. It should also be remembered that the anal and vaginal mucous membranes are so thick that strong solutions of cocaine are necessary to produce anæsthesia, and that the effects of cocaine are only temporary. Where the itching is very obstinate the parts may be painted with a solution of nitrate of silver of the strength of 20 grains to the ounce (1.3 : 32.0) of water, cocaine having been previously applied to relieve the pain of the application. (See article on Cold.) Brinton has highly recommended powdered teucrium scordium in the dose of 20 grains (1.3) three times a day.

Allingham has used with advantage a piece of ivory shaped like a rubber nipple and provided with a circular shield. This is slipped into the bowel at night and serves to keep the surfaces apart.

PUERPERAL DISEASES.

The diseases of the puerperium may be divided into two broad classes—infectious and non-infectious. The first class should be further subdivided into (1) those infectious diseases in which the point of infection has been somewhere along the parturient tract, and (2) those in which the infecting poison has entered the body by some other channel. Under sub-heading 1 come all those diseased conditions grouped together under the very inadequate generic terms "puerperal fever," "puerperal septicæmia," "puerperal infection," and the like, none of which truly express the condition present. If it is necessary in medical nomenclature to have a single term which shall denote infection of the genitalia after delivery, a word should be coined strictly limited in sense to mean the pathological conditions which result from the activity of pathogenic microbes along the whole genital tract. This classification is necessary for a clear and systematic description of the treatment of diseases in the puerperal state.

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[1] For method of preparing this liquor see article on Eczema.

Genital Tract after Labor.—
[illegible] infection along the genital tract
[illegible] maines from the infection and
[illegible] fragments of placenta, or blood within
[illegible] found in more than 75 per cent.
[illegible] Therefore, in any case after
[illegible] cannot be explained by some evi-
[illegible] genitalia, it is safe to assume ptomaïne
[illegible] The indications are plain: to
[illegible] nce stop the manufacture of their
[illegible] essary, to remove their habitat.
[illegible] of this principle in practice is as
[illegible] delivery remains over 100° F. for
[illegible] cause independent of the genitalia,
[illegible] with at least 1 quart (1 litre) either
[illegible] 1 : 2000, or a 2 per cent. solution
[illegible] convenient in private practice, be-
[illegible] limate can be easily carried about in
[illegible] the entrance of the antiseptic fluid
[illegible] the cervical canal an intra-uterine
[illegible] se upon the market, the best is that
[illegible] strument-maker of Philadelphia. If
[illegible] atulous, as it usually is after labor, a
[illegible] to a Davidson's or fountain syringe

[illegible] treatment will bring the temperature
[illegible] -four hours. If fever does not disap-
[illegible] s rises even higher, the second indica-
[illegible] ected albuminous substance within the
[illegible] ved in order to deprive the micro-
[illegible] nd. This is best accomplished by the
[illegible] acental forceps, care being taken in the
[illegible] ument to guard the uterine wall itself
[illegible] only can the uterine muscle be per-
[illegible] hands, but slight wounds of the uterine
[illegible] may be enough to inoculate the gen-
[illegible] se activity has been confined before to

[illegible] mploying this plan of treatment after

[illegible] ervix is seized with a double tenaculum
[illegible] a cleansing uterine douche is then
[illegible] field of operation: next the curette is
[illegible] whole interior of the uterus is carefully
[illegible] first the fundus and then each of the
[illegible] urned with the scraping surface upward
[illegible] cal canal, a finger in the vagina meet-
[illegible] ier to help extract any substances which
[illegible] ed in it.
[illegible] s inserted, and an effort made to grasp

any material lying loose within the cavity or still attached to the uterine walls. It is usually best to repeat each of these manœuvres several times until nothing more can be brought away except a little clear blood.

Then the uterine cavity is again thoroughly washed out. The writer has many temperature charts in his possession which show the success of this treatment when simple uterine irrigation has failed. Occasionally it is necessary to repeat the irrigation, and even the curetting, for several successive days. If, as rarely happens, this treatment should prove unsuccessful and the temperature should remain elevated in spite of irrigation and the use of the curette and placental forceps, one must assume either that general systemic infection has occurred, or at least that an inflammatory action has begun in the uterine walls or within the tract of the tubes. One of the earliest, surest signs of systemic invasion is the appearance of peritonitis.

In such a case the only available treatment is to support the body-cells in the combat which they must wage with the invading micro-organisms. This is best accomplished by the administration of as large a quantity of nutriment as the patient can stand without rebellion of the stomach or bowels, and the exhibition of a large quantity of alcoholic stimulant. Cases of this sort not infrequently require more than a pint of whiskey or brandy in the twenty-four hours. Occasionally measures will be required to reduce an exaggerated elevation of the temperature, but this is best avoided as long as possible, for antipyretic treatment is usually depressing and ill suited to the patient's adynamic condition.

With this plan of treatment about three-quarters of the cases of general septic infection after labor will recover. There may be some in which metastasis to important organs occurs so early as to render all treatment of no avail. There will be others in which the peritoneum is early infected, and in which the septic peritonitis develops rapidly and to an extensive degree. It is in such cases that laparotomy and evacuation of the septic matter, usually pus, within the peritoneum will occasionally save life. The physician must guard himself, however, from the disposition which is prevalent at this day to operate too early and unnecessarily. After operation, drainage of the peritoneal cavity is an essential feature of the treatment, even although the evidence of suppuration within the cavity is slight. The writer has in mind a case in which an operation was performed ten days post-partum for septic peritonitis: a very small quantity of purulent lymph was found upon one ovary, which was greatly enlarged and contained a small quantity of sero-pus. The ovary was removed and the abdomen closed without drainage, as there was no other evidence of suppuration within it. Thirty-six hours later the patient died, and the peritoneal cavity was found filled with pus which had accumulated in that short space of time. In the early stages of the peritoneal infection, if the subject is vigorous, not exhausted by a prolonged labor or other depressing causes, the administration of saline purgatives in concentrated solution will often effect brilliant results.

The Treatment of Infection along the Genital Tract after La
By far the most common form of infection along the genita
after labor is the absorption of ptomaïnes from the infecti
decomposition of membranes, fragments of placenta, or bloo
the uterus. This condition will be found in more than 75
of all cases in which infection occurs. Therefore, in any
labor in which there is fever that cannot be explained by
dent cause independent of the genitalia, it is safe to assum
poisoning and to act accordingly. The indications ar
destroy the microbes, and thus at once stop the manufact
poisonous products, and, if necessary, to remove their h

The writer's routine application of this principle in
follows: If the temperature after delivery remains ov
twenty-four hours without evident cause independent o
he washes out the uterine cavity with at least 1 quart
of bichloride-of-mercury solution, 1 : 2000, or a 2 pe
of creolin. The former is more convenient in priv
cause the tablets of corrosive sublimate can be easily
one's instrument-bag. To ensure the entrance of t
to the fundus and its free exit from the cervical cana
catheter is desirable. Of all those upon the mark
manufactured by Lentz, an instrument-maker of
however, the cervical canal is patulous, as it usua
hard-rubber catheter attached to a Davidson's
answers the purpose perfectly.

In the majority of cases this treatment will b
down to normal within twenty-four hours. If
pear within this time or perhaps rises even hig
tion must be met. The infected albuminous
uterine cavity must be removed in order
organisms of their feeding-ground. This is b
use of the curette and the placental forceps,
employment of the former instrument to gua
from the slightest injury; for not only can th
forated by a curette in clumsy hands, but sli
substance with this instrument may be eno
eral system with the germs whose activity h
the uterine cavity.

The writer's manner of employing th
labor is as follows:

The anterior lip of the cervix is seiz
and pulled gently downward; a cleans
given in order to disinfect the field of o
inserted to the fundus, and the whole int
gone over with the instrument, first th
four sides; then the curette is turned wi
and withdrawn from the cervical cana
ing its tip as it emerges in order to h
may be caught by and entangled in i

Next the placental forceps is inse

after a time, and the
proportion there
or their
sive
ults,
neral
en the
mucous
fore the

es of sep-
for it, and
discovery.
esent symp-
y fatal after-
r employs a ½
a quart of this
ent. Occasion-
everal injections
creolin causes too
e-of-mercury solu-
solution of boric

the kidneys should
e plan of treatment
suppuration occurs in
eless.
ic infection after labor
n one fatal case of this
ringe-nozzle in the hands
or perhaps impossible, to
h, and therefore treatment
will usually not be adopted.
ract and the urinary system
the breasts. Infection of the
nflammation or suppuration, is
nplications that the obstetrician
preparation of the nipple during
y extreme care to secure perfect
tation, infection of the breasts can
occurs, the first effort should be to
o prevent, if possible, suppuration.
is end are derivation of the blood
n active purge, compression of the
the breasts by a suitable mammary

l, in the acute stage of inflammation,
er, and, later, the application of cloths
d laudanum, renewed every three hours.
en of a virulent nature and the amount

of infective material large, this plan of treatment will almost surely dissipate the inflammation and prevent suppuration.

The other infectious fevers of the puerperal state include the infectious diseases which can, under any circumstances, attack the adult female, and their treatment differs in no respect during the puerperium from that adopted under ordinary circumstances, unless there should be developed some local complications.

Non-infectious Diseases of the Puerperium.

Anomalies of Involution.—Superinvolution, an exaggeration of that process by which the uterus is reduced to its normal size after labor, only manifests itself, as a rule, after the puerperal state is completed, and therefore its treatment need not be further considered.

Subinvolution, an arrested or retarded return of the uterus to its normal condition and dimensions after labor, is one of the commonest complications with which the obstetrician has to deal in the management of the puerperium. The cause of subinvolution is always a local one. General conditions, as acute fevers and so on, have no influence whatever upon the process of involution unless they are accompanied by some local complication.

There are two causes which prevent the involution of the uterus which must be borne in mind when one is called upon to treat this condition. The involution may be prevented, on the one hand, by anything which calls an excessive amount of blood to the uterine body, as, for instance, small fibroids within its walls or hypertrophied deciduous membrane remaining adherent to its inner surface. On the other hand, subinvolution may be the result of mechanical obstruction to the contraction of the uterine walls and the reduction of the cavity of the uterus to the normal size. As an example of this we have a retained placenta or a submucous fibroid or adhesions dragging the uterus out of place and preventing its contraction, or, most commonly perhaps, an over-distended bladder and rectum.

In those conditions which result in a hyperæmia of the uterus the cause of an excessive blood-supply must be sought out and removed before one can remedy the subinvolution.

If small fibroids can be detected, the administration of quinine, ergot, and strychnine in pill form has been found most useful. If practical, a faradic current may be employed in addition to medication. If there is an hypertrophied endometrium retained within the uterus, a curette will most quickly and effectually hasten involution. In cases of heart disease in which the blood-current is sluggish and dammed back into the large veins of the trunk digitalis will be the most effective remedy to overcome the subinvolution. There may be an active hyperæmia associated with inflammatory action, either in the uterine wall or upon its peritoneal covering or in its annexa; in this case the inflammation must be overcome by disinfection, the use of purgatives, and, possibly, the local application of hot water, before involution can be secured. When there is mechanical obstruction to the return of the womb to its normal dimensions, the hindrance must of course be removed before one can expect a good result from treatment. In the case of retained adherent placenta every effort must be made to remove the placental tissue. In the case of submucous fibroids their removal must be attempted if there is any hope of safely accomplishing it.

There is no case of labor which does not leave behind, in the parturient tract, some injury to the maternal structures. Usually these are slight in degree, manifesting no symptoms and healing spontaneously. Occasionally the injury done results in fistula communicating with the bladder or rectum, in deep granulating wounds in the vagina, or in ulcerated sores.

In the case of fistula a cure can sometimes be effected without operative interference by touching up the edges of the fistulous tract with nitric acid, in order to excite an outpouring of granulation tissue in the hope that it may plug up the opening. In deep tears, which have not been primarily united, application of a solution of nitrate of silver will hasten the cure and prevent infection of the wounded surface. If ulceration occurs, the ulcerated spots are to be carefully watched and treated in the same manner.

Hemorrhages from the birth-canal after labor depend upon a number of well-known causes, which must be sought out and corrected before the bleeding will cease. Most frequently the cause of a hemorrhage will be found in retained placental fragments *in utero*, which must be removed. Frequently displacements of the uterus will be found as a cause, and correction of the displacement will stop the bleeding.

In interstitial bleeding after labor, resulting in hæmatoma, care must be taken to preserve the parts in as aseptic a condition as possible, while an attempt is made to limit the bleeding by the application of direct cold, preferably by means of a Barnes bag dilated with ice-water, which must be removed from time to time in order to allow the lochia to escape. After rupture or incision of these blood-tumors the cavity left behind must be carefully disinfected with the bichloride-of-mercury solution or creolin, and, if necessary to control further bleeding, well packed with iodoform gauze.

Of all forms of bleeding, that which occurs directly after labor in consequence of inertia uteri, known as post-partum hemorrhage, is the most frequent, the most alarming and dangerous in its manifestations and consequences. No one should attend a case of obstetrics without having in mind a clearly-defined programme to be put in immediate execution when called upon to deal with this frequent and dangerous complication. There are two indications to be met: First, to control the hemorrhage, and, second, to treat the after-condition. The first indication is met by the following plan of treatment:

External stimulation of the uterus by kneading and rubbing through abdominal walls, as is practised in Credé's method of expressing the placenta.

Next carry the other hand into the uterus and remove any blood-clots, pieces of placenta, or membrane that may be found there, so that the internal surface of the uterine walls is irritated by the movements of the operator's fingers.

Next apply a small piece of ice upon the abdomen externally, and carry another piece the size of a hen's egg into the uterine cavity. The use of cold must not be persisted in for more than a minute at most, for its ultimate action is depressing and relaxing.

Next soak a clean linen handkerchief in vinegar, carry it up to the fundus, and squeeze it out so that the vinegar shall run down over the uterine surface.

Next, hot water at a temperature of 116° or 120° F. should be injected into the uterine cavity.

If one happens to have the necessary appliances at hand (a small Gaiffe battery, which can be carried in an ordinary instrument-bag), a strong faradic current can be applied to the uterine muscle.

Finally, as a last resort, the uterine cavity may be packed with long strips of iodoform gauze in the manner suggested by Dührssen and carried out by a number of observers with gratifying success.

Drugs, as the styptic salts of iron, and especially Monsel's solution, have been recommended from time to time as intra-uterine applications in the case of post-partum hemorrhage, but they are dangerous, for the coagulation produced by them may extend far into the uterine vessels, and the clots must be broken up by putrefaction, exposing the patient to the danger of septic poisoning.

This programme is to be carried out in the order given: if the milder measures suffice, of course the more radical plans of treatment will not be employed. Excessive hemorrhage (post-partum) from lacerations along the genital canal can be controlled by well-placed sutures.

Bearing in mind this plan of treatment, it is almost inconceivable that an intelligent and skilful practitioner should lose a case of post-partum hemorrhage.

The physician should give ergot in full dose by the mouth and, if need be, hypodermically.

Treatment of the After-condition.—While the physician is busy controlling the hemorrhage the nurse should administer a hypodermic injection of ether if symptoms of shock or collapse are manifested. After the bleeding has ceased it is well to administer an enema of a pint of hot water, which maintains the patient's temperature, relieves the shock, and by its irritation promotes contraction of the uterine muscle. This should be succeeded by small doses of hot, strong brandy-and-water, and a little warm milk if the stomach will retain it. As soon as reaction is well established a half-pint (250 cc.) of hot beef-tea should be administered, and a hypodermic of $\frac{1}{8}$ grain (0.008) of morphine given in order to secure quiet and rest and to get the stimulant qualities which this drug undoubtedly possesses. Occasionally measures must be adopted to retain enough blood within the large vessels and in the heart to prevent excessive cerebral anæmia or cardiac failure. This is best done by auto-transfusion; that is, by bandaging the extremities from below upward, in order to secure as large a quantity of blood as possible within the vessels of the trunk and brain. Actual transfusion of a $\frac{6}{10}$-of-1-per-cent. solution of common salt into the blood-vessels is required when there are profound exhaustion and depression after hemorrhage. It has been demonstrated that it is not necessary to throw this solution directly into the blood-vessels, as interstitial injection seems to answer the purpose equally well.

The milk secretion during the puerperal state presents abnormalities which call for treatment. One may have to deal with anomalies of quantity or quality. The most frequent anomaly of quantity in milk secretion is unfortunately one of defect. Insufficient milk-supply depends on a number of causes. Perhaps the most frequent is a lack of development of the glandular tissue, and in this form of insufficient milk secretion no treatment can be of avail. When the lack of milk is due to some intercurrent affection in the puerperal state the treatment must be directed toward this complication before the milk-supply can be re-established in normal quantity. It may be the consequence of hemorrhages or of diarrhœa, or the result of an acute febrile attack during lactation, or of inflammation within the gland itself. Serious organic disease may also be a cause, and insufficient nourishment must be held accountable in some cases. Profound emotions exert an extraordinary influence upon lactation in altering both the quantity and the quality of the milk. It has long been supposed that the return of menstruation has a disastrous influence upon milk secretion. This, however, has been definitely disproved by careful observations recently conducted in Austria. The return of normal menstruation without complications has no apparent influence, as a rule, upon the quantity or quality of the woman's milk. In all the temporary diseases interfering with milk secretion described above it should be borne in mind that on the disappearance of the abnormal general or local condition milk secretion can be successfully re-established, even though it be absent for days or weeks. Electricity has been much vaunted of late as a remedy for insufficient lactation. It may be applicable in cases of torpidity of the mammary gland or in those cases where lactation has been suppressed on the birth of a first child, and where the mammary gland, therefore, does not respond readily to the stimulus of subsequent births. This remedy will, however, often prove ineffective and disappointing.

Instances of excessive milk secretion are not infrequently met with. In the milder and simpler forms they can be managed by regulation of the diet and free purgation. Galactorrhœa, a constant flow of milk from the breasts, is one of the most stubborn forms of excessive milk secretion. Two measures can usually be relied on to give relief: firm compression of the mammary gland with the application of belladonna ointment, or the administration internally of iodide of potassium. In some cases of this character milk secretion stops spontaneously with the return of menstruation, and in a certain proportion of cases a treatment to secure a discharge of blood from the uterus has been successful in stopping the flow of milk. Success has been obtained with Simpson's plan of introducing a piece of caustic within the uterus in order to bring back the menstrual flow. Warm douches have been used successfully for this purpose. Electricity has been recommended to secure the proper contraction of the sphincter muscles of the lactiferous ducts, but as this is usually a result, and not a cause, of the galactorrhœa, the use of electricity must prove in the vast majority of cases ineffective. The long-continued administration of ergot has been warmly recommended. The remedy should be tried, for its use seems rational. Chloral has been shown to be very effective in diminishing the quantity of milk. This drug, therefore, is worthy of trial. It has recently been declared that antipyrine, in 2½-grain (0.12) doses three times a day, will diminish milk secretion. The drug, however, has not been tested often enough to demonstrate its power. Quantitative anomalies in the milk secretion must often depend upon an ill-regulated diet. A fatty diet will diminish the quantity of milk; a vegetable diet will diminish the casein, and fat will increase the sugar; a diet rich in meat, especially if reinforced with alcoholic stimulants, will increase the fat and casein, but will diminish the sugar. If the mother's milk is evidently disagreeing with the nursing infant, a chemical analysis of it should be made, and on the result rules regulating the diet should be adopted. The most common mistake in practice is to over-feed a nursing woman, especially with a milk diet, with the idea which prevails extensively among the laity that the cow's milk poured into the stomach appears again in the mammary gland. It is usually sufficient for a nursing woman to observe the ordinary diet which agrees with her under all circumstances, with the addition perhaps of a half-pint of milk midway between the morning and mid-day and mid-day and evening meals. Occasionally a wineglassful of malt at the mid-day and evening meals is a useful addition to the diet, and in anæmic patients the addition to the malt of 5 grains (0.3) of pyrophosphate of iron will be an advantage.

There is found in every pregnant woman some alteration in the constitution of the blood, which consists, roughly speaking, of a diminution of the red blood-corpuscles and of the albumin and the iron in the blood, with an increase in the white blood-corpuscles and the watery element. In some cases this change is much exaggerated, until an intense degree of anæmia appears in the puerperal state which, in its severity, will simulate pernicious anæmia or some fatal form of blood disease. The anæmia of puerperal women, however, even in exaggerated cases, usually yields to treatment in a most gratifying manner. After the prolonged use of Blaud's pills the writer has seen the blood-corpuscles rise from less than three to nearly four and a half millions, and the hæmoglobin increase from 40 to 75 per cent. in a few weeks. In some cases arsenic alone succeeds where iron fails completely.

Eclampsia.

To treat eclampsia intelligently and successfully it is necessary to understand its etiology as fully as modern knowledge permits. Although the subject needs more light from future investigations, enough is now known to justify the following statement:

1. The cell-activity of mother and fœtus produces excrementitious substances which will surely prove virulently poisonous to the whole organism unless they are voided or made harmless by the excretory organs.[1]

2. The organs in the childbearing woman are often inadequate to the disposal of effete material from the maternal and fœtal bodies.

3. Consequently, poisons, of a nature not yet demonstrated, are stored up in the maternal blood until, by cumulative action, their presence is manifested in the eclamptic seizure and other symptoms.

4. The convulsions are probably the result of an acute cerebral anæmia brought about by violent contraction of the arterioles, possibly by direct irritation of the brain-substance. As a result of intense muscular action the circulation is interfered with, and blood is determined to non-muscular regions, as the brain, lungs, kidneys, etc., to such a degree that the congestion of these parts become dangerous, leading to apoplexy in the brain, œdema in the lungs, and often a complete abrogation of renal function.

The indications for treatment in convulsive seizures of this nature are plain:

First, to attack the *fons et origo mali*, and to eliminate the poisons from the blood as quickly and in as large quantities as possible. Second, to diminish nervous sensibility and lessen muscular power, in order to reduce the convulsions in vehemence, duration, and frequency. Third, if convulsions occur during labor, to save the infant without adding to the risk of the mother. Fourth, to guard the woman from injury during the attack.

The first indication is met by venesection, diaphoresis, and catharsis. By the first, one eliminates a certain quantity of poison along with the blood and relaxes the muscles. If there is sharp post-partum hemorrhage, or if the patient is from any cause weak and anæmic, bloodletting is not called for. In the ordinary case, however, with full pulse, congested head, the veins standing out upon the neck and face, venesection is an undoubted advantage. While the median basilic of one or both arms is being opened some croton oil should be sent for, and 2 drops (0.1) mixed with sweet oil may be placed upon the tongue. Directions should at the same time be given to wring out three or, better, four old blankets in boiling water; these are to be wrapped around the legs, trunk, and arms, and well covered over with one or more dry blankets. The sweating thus induced is profuse. An ice-bag must be put to the head to prevent over-congestion of the brain. In this way one eliminates the cause of eclamptic convulsions as quickly and thoroughly as possible from the blood, directly and indirectly through the skin and bowels. The latter may be acted upon by ¼ grain of elaterium rubbed up in butter, or by compound jalap powder and calomel, instead of resorting to the croton oil. Pilocarpine seemed at one time an ideal remedy to secure diaphoresis in eclamptic cases, but it has lately fallen into well-deserved disrepute. It much increases the danger of pulmonary œdema, and is too profound a depressant. It is no longer employed by experienced and educated obstetricians. The second indication is best met by an anæsthetic. Usually the convulsion first shows its approach in the eyes: these should be closely watched, so that on the first symptom of the oncoming attack chloroform may be at once administered and pushed as rapidly as possible. Ether is inadmissible in these cases, for it is slow of action, congests the brain, and irritates the kidneys. Just before the woman is wrapped in blankets 1 drachm (4.0) each of chloral and bromide of potassium in starch-water should be injected into the rectum. This may be repeated in an hour if necessary. Morphine, veratrum viride, and inhalations of nitrite of amyl have their enthusiastic advocates in this connection. They may be held in reserve in case the plan of treatment described needs reinforcement.

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[1] Harold C. Ernst, *American System of Obstetrics*, vol. ii. p. 431.

If convulsions come on during labor, the child should be rapidly extracted as soon as the os is well dilated, but not before, because efforts to dilate the os would be very apt to increase the convulsions, and would attract the physician's attention from the woman's most threatening danger. Moreover, the os dilates naturally with unusual rapidity during eclampsia.

The only injury to be feared during eclamptic attacks is wounds of the tongue from the teeth. This can be prevented by inserting between the teeth a brush-handle wrapped in a handkerchief or by drawing a towel into the mouth like a bit. Well-meaning but ignorant bystanders will sometimes throw themselves upon an eclamptic patient to restrain her convulsions by force. This should be forbidden.

REMITTENT FEVER.

This is sometimes called bilious fever by reason of the violent bilious vomiting and jaundice which often accompany it. It separates itself from intermittent fever by the fact that the patient's condition, chiefly as regards temperature, does not have normal intervals, but has periods of only temporary improvement, or, in other words, the disease remits.

For the proper treatment of this fever, three things must be borne in mind: 1. It is more dangerous than intermittent fever; 2. It is dangerous in the hot stage, not in the cold stage; 3. The patient, not having periods for complete or partial recovery, rapidly loses strength. The safety of the patient depends upon the use of large doses of quinine to cut short the pyrexial stage, the doses used being from 20 to 30 grains (1.3–2.0), preceded by a good-sized purgative dose of calomel, say 3 to 4 grains (0.15–0.2). If vomiting is too violent to permit of the retention of the quinine, it must be used by the rectum and hypodermically, and the stomach and intestines be swept out by the use of divided doses of Seidlitz powder or citrate or sulphate of magnesium. If purgatives are used, they should precede the quinine by twenty minutes, as otherwise the latter drug is swept out into the bowels, where it is rendered useless by reason of its precipitation by the alkaline juices there present. Many clinicians claim that remittent fever is chiefly benefited by quinine during the remission, and cinchonism during the pyrexial stage undoubtedly increases the discomfort of the patient. If pyrexia is excessive, relief must be sought in the cold pack and antipyrine.

The best treatment of the vomiting is the use of small doses of morphine, or 3- to 5-drop (0.15–0.3) doses of the spirit of chloroform in from 30 drops to 1 drachm (2.0–4.0) of cherry-laurel water. Aconite may also be used if the patient is strong enough. (See Vomiting.)

If the belly is tender, a turpentine stupe should be applied. (See Turpentine.)

If intestinal hemorrhages occur, gallic and tannic acids or Monsel's salt, in the dose of 3 grains (0.15) in hard pills, may be used, and cold cloths be placed over the belly. (See Hemorrhage.)

If hæmaturia appears, quinine must be avoided unless the necessity for its employment is absolute because of the frequent recurrence of paroxysms. Quinine in some cases increases the hæmaturia. (See Collective Investigation by author in *Therapeutic Gazette*, July, 1892.)

The treatment of convalescence consists in the use of tonics, such as quassia, calumba, gentian, Huxham's tincture, arsenic, and purgatives when needed, with attention to the kidneys, the potassium salts being employed to keep these organs active. (See Intermittent Fever.)

RETINITIS.

Retinitis, or inflammation of the retina, often associated with choroiditis, is commonly the result of several constitutional diseases: Bright's disease, diabetes, syphilis, etc. In some cases no cause can be found. The general remedies must be directed according to the supposed cause, and the eyes must be protected from light and all close work avoided. Very distinct retinal irritation may be caused by eye-strain, which is to be relieved by the prolonged use of atropine and dark glasses, and later suitable lenses for the correction of any existing error in refraction.

RHEUMATISM (ACUTE ARTICULAR).

No better example of the fact that therapeutics is in advance of pathology can be adduced than the disease known as rheumatism. The therapeutist cannot tell how he cures the condition designated by this name, simply because the pathologist cannot tell what the cause of the disease is, and when this information is forthcoming from the one side, an explanation will be immediately given by the other. This being the case, we must devote ourselves to the study of pure empiricism, and not to logical pharmacology.

The treatment of acute articular rheumatism is divided into that portion devoted to the cure of the disease-process, and that directed to the relief of the pain and of the local manifestations of the disease.

When an acute attack of rheumatism comes on, it is nearly always accompanied by a high temperature, a bounding pulse, and all the evidences of the active systemic disturbance accompanying inflammatory outbreaks, which, in this particular instance, involve the joints. We may therefore use at such times the remedies which we have learned are best able to combat inflammation—namely, aconite and veratrum viride. So powerful are these drugs in the early stages of acute rheumatism that some persons have believed them to be possessed of a specific antirheumatic power. This is, however, highly unlikely, as they act no better here than in other inflammatory conditions elsewhere.

The proper manner in which to use the tincture of aconite under these circumstances, in a strong, healthy individual, is to administer 3 drops (0.15) at once in a little water, and follow it by a teaspoonful of a mixture containing 5 drops (0.3) of tincture of aconite and 2 ounces (64.0) of water, every half-hour until perspiration on the skin betokens circulatory depression through the action of the drug. If this is not used, veratrum viride in the same proportions may be given. The advantages of this treatment are numerous; first, it allays the fever; second, it quiets nervous excitability; third, it tends to prevent permanent changes in the joints which are involved; and, last of all, it aids in the production of a sweat. Whenever these drugs are employed the patient must be strong and hearty, not debilitated or weak, and it is to be noted that this treatment is not to be resorted to carelessly. Finally, care is to be taken that the symptoms of depression from the drug and the disease combined do not become too severe. Where great exhaustion is primarily present or ensues upon the use of depressant drugs, alcoholic stimulants are particularly needed.

Simultaneously with these internal measures a solution of bicarbonate of sodium, 20 grains to the ounce (1.3 : 32.0), may be applied to the joints involved, by means of lint wet with this solution, with relief to the sense of heat or burning, or ice-cold compresses may be tried. In other cases relief may be obtained by applying hot cloths saturated with the so-called Fuller's lotion—namely, carbonate of sodium 6 drachms (24.0), laudanum 10 ounces (320.0), glycerin 2 ounces (64.0), and water 9 ounces (288.0). Sometimes great relief is obtained by fixation of the joints by means of splints.

A most valuable application to the inflamed joints of rheumatism, either during the acute stage or afterward when they remain swollen and enlarged, is:

℞.—Ichthyol . . . . ʒiv vel ℥j (16.0–32.0).
Adipis . . . . ℥ij (64.0).—M.
S.—Rub in well and apply about the inflamed part on lint.

In other cases the acute stages of the inflammation may be combated with advantage, particularly where there is gastric disorder, by the local application of salicylic acid made into an ointment with an animal fat, not vaseline or glycerin, as it is not absorbed when so mixed. According to Bourget, this treatment is best suited to blondes and young persons, as absorption is more rapid in this class of patients. The following salve may be prescribed:

℞.—Acid. salicylic.	ʒj (4.0).
Ol. terebinthin.	♏xxx (2.0).
Lanolin.	℥j (32.0).—M.

High fever is to be controlled by the same measures as the high fever of any other disease—by the cold pack, cold bath, or sponging with tepid or cold water, and by antipyretics.

Immediately after the system has been thoroughly impressed by cardiac sedatives—or at once and in their place if the case is not seen at first or is weak—the physician should resort to one of three remedies—namely, salicylic acid or its salts, acetanilid, or antipyrin. The general opinion of the profession seems to be that these three remedies stand in the order here placed in regard to their efficiency, but it is also true that one will often succeed when the other fails, and it is worthy of note that success or failure generally asserts itself rapidly; that is, the drug used gives relief in from twenty-four to seventy-two hours or fails altogether. It is most important to remember that salicylic acid only protects the cardiac valves and the entire endocardium from the ravages of the disease by shortening the attack, and not by any direct influence, and in addition that this acid, by reason of the profuse sweats often produced by it and its tendency to cause cardiac depression, must be watched lest it act unfavorably on the general systemic state.

Taking up salicylic acid first, we find that its proper use is often misunderstood, and that it fails because of this fact. Whenever acute articular rheumatism appears the salicylic acid should be pushed in the same way that we use quinine on the advent of a malarial paroxysm—namely, in full dose.

It is useless to give salicylates in 5- or 10-grain (0.3–0.65) doses three times a day; they must be given in 20-grain (1.3) doses, morning, noon, and night, or oftener, or not at all. If the sweats are too severe or the stomach rebels, they may be stopped, but not decreased in amount unless for good reason. Further than this, if salicylic acid is used for two or three days in this way, and produces evidences of cinchonism, yet fails to alter materially the course or severity of the trouble, it should be withdrawn, as it will rarely if ever do any good after this time. (See article on Salicylic Acid.)

A very efficient substitute for salicylic acid is the oil of gaultheria (wintergreen), which contains over 90 per cent. of salicylate of methyl. The dose should be 10 to 20 drops (0.65–1.3) on a teaspoonful of sugar or in capsule or emulsion three times a day, after meals. (See article on Gaultheria.)

Antipyrin and acetanilid may both be considered together, since their action is identical in rheumatism. The author believes that antipyrin, while often relieving the pain more than the acetanilid, nevertheless does not act so favorably in decreasing the duration of the disease. The dose of the first should be 5 to 10 grains (0.3–0.65) three times a day; of the second, 4 to 8 grains (0.2–0.6) at the same intervals.

The studies of Guttmann with acetanilid in a very large number of cases of rheumatism, embracing all its forms, both chronic and acute, have given most encouraging results, and the author has seen the drug act most happily in cases which had refused to yield to the iodides and salicylates, although all of these cases were of the severe acute form, suffering intense pain from the articular inflammation, but devoid of any cardiac complications. It at once becomes evident that a drug such as antipyrin or acetanilid may do good in a case of rheumatism in three entirely separate and distinct ways, any one of which may be active at once or all active together, hand in hand, in the improvement of the patient's state. Any substance possessing strong antipyretic power must be of value under such circumstances, because of the lowering of the fever which follows its administration, with the resulting quieting of an excited system, and in putting aside the delirium associated with a condition of hyperpyrexia. Not only does such a drug act favorably in this manner, but the analgesic effects of such a substance must exert a powerful influence for good. By benumbing the sensibility of the patient to the excruciating pain consequent upon movement, and so putting aside the nervous wear and tear of sleeplessness and suffering, the patient's state must be improved, or at least not grow worse from the exhaustion of the long hours of agony. Further than this, it would seem probable that acetanilid possesses a direct antirheumatic influence, allaying the disease-processes even in those forms where, pain being largely absent, the improvement must be real and not apparent.

The intention of the author is not to extol the value of acetanilid and antipyrin in rheumatism to the exclusion of other means of relief, nor to recommend their use before the more thoroughly tried salicylates and iodides, but to draw to their standard a certain number of cases which persistently resist treatment of the ordinary stamp, and which put the physician to his wit's end for a change of treatment at least promising some chance of relief. Many of the readers of this book have doubtless seen such cases, and many of them must have learned by sad experience that acute articular rheumatism is in many cases bound to run a course of so many weeks or days, do what we will. Under these circumstances nothing acts further than a palliative, and the patient and his friends become impatient for a change. The author has found that acetanilid in such cases will often relieve the pain, and so permit a refreshing sleep, in doses of from 4 to 8 grains (0.2–0.6) three times a day, and that these amounts do not cause the excessive sweating which the necessarily large doses of salicylate are sure to produce—sweats which leave the patient oftentimes almost dyspnœic from very weakness. Whether this temporary relief produces such changes in the system as to permit of a better battle against the disease, or whether it actually counteracts the rheumatic poison, we know not; but we do know that after the use of acetanilid the relief is not only temporary, but often permanent, and that a very distinct step in advance is made toward the close of the attack if any influence at all is felt.

The following prescription, which is of additional value because the caffeine supports the heart and increases urinary secretion, is recommended:

℞.—Acetanilid. . . . . gr. xl (2.6).
Caffein. . . . . gr. xx (1.3).
Camphor. monobromat. . . . . gr. xx (1.3).—M.
Ft. in capsul. vel pil. No. xx.
S.—One every three hours or three times a day.

Phenacetin is often very useful when used in rheumatism, particularly if combined with salol.

Passing from what may be appropriately called the coal-tar treatment of rheumatism, because all the drugs so far named for internal use have such a source, we come to a list of remedies heretofore largely used in rheumatism in place of the newer compounds, but which are not so commonly employed to-day.

These remedies act, as a rule, in the subacute forms of rheumatism or in the cases where the first group fail because the disease is obstinate. Of these the chief is the iodide of potassium, followed by the acetate, bicarbonate, and citrate of potassium. If the iodide is used, the following prescription is of service:

℞.—Potassii iodidi . . . . ℥j (32.0).
Syr. sarsaparillæ comp. . . . . f℥vj (192.0).—M.
S.—Dessertspoonful (8.0) three times a day, after meals.

In other cases it is best, because of the disagreeable taste of the iodide, to give it in sugar-coated pill or in tablet form, but care should be taken that milk or water is taken at the same time to prevent gastric irritation.

Or, if preferred, 20 to 30 grains (1.3–2.0) of the bicarbonate of potassium may be taken every four or five hours in water flavored with cinnamon for the sake of the taste, or the citrate of potassium, which is more agreeable, may be taken in equal amount. Sometimes a little colchicum added to the prescription given above may be useful if the case is very obstinate, as follows:

℞.—Potassii iodidi . . . . ℥j vel ℥ij (32.0–64.0).
Vini colchici radicis . . . . . . fʒij vel f℥ss (8.0–16.0).
Syr. sarsaparillæ comp. . q. s. ad f℥vj vel f℥xij (192.0–384.0).—M.
S.—Dessertspoonful (8.0) three times a day, after meals.

Haig has proved that in rheumatism there is retention of uric acid, and that the use of alkalies and the salicylates at once causes this substance to be changed into a soluble form ready for elimination.

The other drugs used in acute rheumatism are numerous, but only a few of them deserve attention here. There is abundant evidence on record that full doses (10 to 30 drops [0.65–2.0]), of the fluid extract of cimicifuga if given every five hours will decrease the redness and pain of the joints and shorten the attack in some cases. Again, certain species of rhus, as rhus toxicodendron, are useful if fresh preparations are at hand. The dose of rhus toxicodendron is thing to do or to have done, and therefore impress him with the object-lesson that his attendants are attendant and alive to his suffering and need of sympathy and care.

Among the lower classes the belief in liniments is very widespread, and their use will often instil into the minds of the friends a far greater confidence than the most logical of treatments with the liniment left out of the list of remedial measures.

The following liniments will be found very useful under these circumstances:

℞.—Tr. aconiti	fℨij (8.0).
Tr. opii	f℥j (32.0).
Olei terebinthinæ	f℥j vel f℥ij (32.0–64.0).
Linimenti saponis . . . . q. s. ad	f℥viij (256.0).—M.

S.—Poison. Use as a liniment three times a day.

Or,

℞.—Aquæ ammoniæ fort.	fℨiv (16.0).
Olei cajuputi	fℨj (4.0).
Tr. belladonnæ	f℥j vel f℥ij (32.0–64.0).
Linimenti camphoræ . . q. s. ad	f℥viij (256.0).—M.

S.—Poison. Use as a liniment.

Or,

℞.—Tr. opii Tr. aconit. Aquæ ammon. fort.	āā fℨiv (16.0).
Linimenti chloroformi	f℥vj (192.0).—M.

S.—Poison. Use as a liniment to chronically-inflamed muscles or joints.

In other instances the greatest relief is obtained by employing the following ointment of veratrine:

℞.—Veratrinæ	gr. xxx (1.6).
Hydrargyri iodidi flav.	ℨj (4.0).
Petrolati	℥ij (64.0).—M.

S.—Use as an ointment over the joints.

This ointment ought not to be widely distributed, and the pulse and respiration should be watched, as the veratrine may be absorbed and depression of a severe character set in.

For the reduction of enlargements of the joints due to the disease, and accompanied in some cases by pain, the following ointment is serviceable:

℞.—Unguent. iodi	℥j (32.0).
Adipis	ℨiv vel ℥j (16.0–32.0).—M.

S.—Apply locally.

Or, still better,

℞.—Ichthyol.	ℨiv to ℥j (16.0–32.0).
Adipis	℥j (32.0).—M.

S.—Rub into the joints thoroughly.

Ichthyol is certainly the most efficient remedy that we have for the enlarged and painful joints.

The employment of red flannel over inflamed joints is no better than the use of white flannel, and it is never beneficially "medicated," as claimed in the stores. The only advantage of red flannel is that, as it is dyed, the wool is often better for not being thoroughly bleached, and is in larger amount. The disadvantages of red flannel are that if the patient sweats it stains the clothes, and the possibility of its producing irritation of the skin or even systemic effects of an evil character.

RICKETS.

Rickets may be defined as a state of the body of an infant or child in which there is a deficiency of the normal salts of the bones and tissues, with corresponding enlargement of the organic portion of the bone, or, in other words, the cartilaginous parts. Generally the term is applied solely to designate bony troubles, but every practising physician sees cases where the manifestations of rickets are emphasized in gastro-intestinal disorders rather than in bony deformities. The chief cause of rickets in children, aside from the presence of any disease, such as scrofulosis, is inanition; that is, non-nutrition of a specialized form, or, in other words, bone-salts starvation. This may occur after or before birth, and it is quite common to see children, born of mothers ill-fed or whose assimilation of salts is defective, with soft bones or a distinct tendency to rickety development.

The treatment of rickets is therefore largely dietetic and devoted to the improvement of the food and digestion. No part of the body fails in force more than the digestive apparatus in the presence of this disease, probably because the alkalinity of the blood is altered, and partly because the stomach cannot secrete properly-formed juices from imperfectly-nourished glands.

The medicines to be used in rickets are general tonics, digestive tonics and stimulants, and bone tonics and stimulants, such as salts of lime and phosphorus. The general tonics are quinine, cod-liver oil, nux vomica, and iron, while the digestive tonics are the simple bitters, physostigma, and mineral acids. The bone tonics and stimulants are lime salts, phosphorus, and phosphate of zinc.

Tonic treatment is best carried out in young children by the administration of quinine in the form of quinine chocolates or by the use of strychnine in the dose of $\frac{1}{200}$ to $\frac{1}{100}$ of a grain (0.0003–0.0006) in sugar-coated pink granules. Arsenite of copper in the dose of $\frac{1}{100}$ of a grain (0.0006) in tablet triturate three times a day is also useful.

A very useful preparation is the following:

℞.—Olei morrhuæ . . . . f℥vj (24.0).
Syr. calcis lactophosphat. }
Liquor calcis } . . . . . āā f℥iij (96.0).—M.
S.—½ to 1 teaspoonful (2.0–4.0) two or three times a day. Shake thoroughly.

Nux vomica is so bitter as to be difficult of administration to young children, and when given only $\frac{1}{8}$ to $\frac{1}{4}$ of a drop (0.008–0.016) of the tincture should be used, three times a day.

Where a distinct scrofulous tendency exists and anæmia is present small doses of the syrup of the iodide of iron are of service, and $\frac{1}{10}$

to 1 drop (0.006–0.05) may be given three or four times a day to a child of six months or a year, thus:

℞.—Syrupi ferri iodidi . . . . . . gtt. iij vel xxiv (0.15-1.5).
Aquæ dest. . . . . q. s. ad f℥iij (96.0).—M.
S.—Teaspoonful (4.0) every four or five hours during the day.

Or,

℞.—Syrupi ferri iodidi . . . . gtt. v vel xx (0.3-1.3).
Syrupi . . . . q. s. ad f℥iij (96.0).—M.
S.—Teaspoonful (4.0) three times a day, after meals.

Here, again, arsenite of copper is a particularly valuable remedy.

The salts of lime and sodium are of direct benefit to the bones, forming by their presence in health a large proportion of the osseous system, and therefore they may be considered as foods rather than drugs. Very often their administration to nursing mothers or pregnant women saves the maternal teeth from caries and preserves the general health of the mother and child. The following prescription may be used:

℞.—Syrupi calcis lactophosphatis . . . . . . f℥iv (128.0).
S.—$\frac{1}{2}$ to 1 teaspoonful (2.0–4.0) three times a day, after meals.

The reasons for the use of phosphorus are clear, from what has been said of that drug when speaking of it elsewhere in this book, as it acts as a direct and powerful stimulant of bone-growth.

Phosphorus is best given to children in the form of very small sugar-coated pills ($\frac{1}{200}$ gr. [0.0003]), such as are put up in the form known as "pink granules" by manufacturing chemists.

Phosphate of lime and phosphate of sodium are valuable remedies in rhachitis. They are never to be used in large doses, because they will not be assimilated and will only disorder the stomach. The proper dose of each is 1 to 2 grains (0.05–0.1), placed in the milk, where their presence will not be noted.

The ventilation of the rooms where a child prone to rickets is kept should be excellent, not too hot or cold and free from draughts. A cool sponge-bath is useful at night if the patient is strong enough, or a good rubbing with salt and whiskey, 1 drachm (4.0) of salt to a pint of whiskey, is of still greater service.

Special attention should be paid to the development of the muscles by massage and passive movements, as these parts are always weak. Walking must not be allowed too early, as it may cause bony deformities.

SCARLET FEVER.

This disease, the most fatal of all the exanthematous diseases of childhood, requires the greatest care in its treatment. Complications constantly arise requiring skill on the part of the attendant, and it is upon his success in treating these outbreaks, as well as in the general direction of the case, that the life of the patient chiefly depends. It has been claimed by certain practitioners that one or two remedies, which they have used, act as abortifacients of the attack, decreasing its severity, its duration, and the probability of complications. Thus, one European physician has used salicylates with wonderful results, if his claims are true, for he found them to prevent all complications and even to remove them when present. He gives, throughout the entire attack and for some days after defervescence has ensued, the following:

℞.—Sodii salicylat. . . . . gr. xlviij (3.0).
Aquæ destillat. . . . . f℥ij (8.0).
Syr. aurantii . . . . q. s. ad f℥iij (96.0).—M.
S.—Teaspoonful (4.0) every hour during the day and every two or three hours at night, in a little water.

In this country J. C. Wilson has employed chloral throughout the entire attack, with asserted good results, in the following manner; but in the opinion of the author this method is not the best for most cases, unless the nervous manifestations are very marked, when the chloral treatment is of great value.

The plan is as follows: "As soon as the patient is suspected or known to be developing scarlatina, a laxative dose of calomel, proportionate to the age and general condition, is administered. Shortly thereafter chloral is given in moderate doses, at intervals of two or three hours or longer, throughout the attack. The dose varies with the age of the child; the frequency of its administration depends largely upon its effect. To infants of two or three years a dose of from 1 to 2 grains (0.05–0.1) may be given, the dosage being gradually increased with older children, that for adolescents reaching 5 grains (0.3). The tranquillizing and sleep-producing effects of the drug are, in most instances, promptly realized, the patient falling into a condition of quietude, instead of the restlessness and jactitation which are so distressing in the well-developed forms of the disease.

"The repetition of the dose should not be more frequent than is necessary to maintain this condition of quietude—a condition from which the patient may be easily aroused, and into which he quickly relapses when left undisturbed. It is neither necessary nor desirable to push the drug to the establishment of a deeper sleep. Profound narcotism is, of course, to be avoided. The patient may thus be kept in a condition of light repose throughout the whole duration of the fever. By this means not only is there obtained relief from the restlessness and distress of the active period of disease, but much wear and tear of the nervous system and some exhaustion from muscular effort are prevented. Delirium is controlled; the itching and burning of the skin, due to the eruption, are allayed; in a word, the greater number of the distressing symptoms of the disease are favorably influenced by the cautious and prolonged administration of chloral hydrate in efficient doses."

As a rule, the drug is easy of administration and well borne by the stomach. Its acrid after-taste is best masked by its administration in Aubergier's syrup of lactucarium, diluted, thus:

℞.—Chloralis . . . . gr. xxx (2.0).
Syrup. lactucarii (Aubergier) }
Aquæ } . . f℥ss vel f℥j (16.0-32.0).—M.
S.—A teaspoonful (4.0) in iced water every two, three, or four hours.

"The administration of nourishment immediately after the medicine is desirable. The sleep-inducing properties of the drug manifest themselves rapidly, but are not prolonged; therefore its repetition at intervals of two or three hours is called for."

From the very beginning of an attack to its end unless diabetes comes on, the child should be supplied with plenty of pure water, and, if possible, this water should be obtained from a spring containing a low percentage of solids, as Poland water, which is widely sold throughout this country. If this is impossible, then Vichy water may be employed, or it may be used by obtaining the granulated Vichy salts sold by most large drug firms, and adding this in small amounts to pure filtered or distilled water. This makes an effervescing draught which may be taken while bubbling or not as the child desires. The object of this treatment is to flush out the kidneys, and to so dilute the effete matters generated in the body by the fever and the germs of the disease that they lose, to a great extent at least, their poisonous and irritating powers.

In other cases a prescription containing sweet spirit of nitre and citrate of potassium proves useful, as follows:

℞.—Spt. æther. nitros. . . . . f℥j (32.0).
Potassii citratis . . . . ʒij (8.0).
Aquæ . . . . q. s. ad f℥vj (192.0).—M.
S.—Teaspoonful (4.0) every two hours if the urine is high-colored.

The convulsions which sometimes usher in an attack are to be treated by 5-grain (0.3) doses of chloral and 10 to 20 grains (0.65–1.3) of bromide of sodium for a child of five to eight years. The convulsions of the advanced stages are often uræmic, and must be treated accordingly.

The further treatment of the disease rests upon the symptoms alone. We cannot cure the patient by the use of remedies, but we can do much toward making the pathway to health smooth and free from pitfalls and obstructions.

Probably the most common complications calling for treatment, when the kidneys have been treated in the way just spoken of, are high temperature or fever, and sore throat or angina. The fever is to be controlled in these cases in precisely the same way that it is in all other conditions in which it is present. It is best to attempt to keep it down below 101°, or at least below 102° F., by tepid sponging, which also allays the itching of the skin, or, if the fever still rises, by the use of colder water, or even the cold pack if the parents will allow it. Generally the popular fear that the application of cold to the surface will drive the eruption "inward" is so strong as to make the cold pack objectionable in the eyes of the friends; but if the temperature reaches 105° F., the physician must assert the fallacy of this belief and insist on its use. (See Cold, Part III.) If suppression of the rash does occur, we must use the wet pack. (See Heat, Part III.) Antipyrin and acetanilid, to be sure, may both be used, but it is worthy of note that each of these may produce collapse or other complication if large doses are necessitated by an obstinately high temperature. If these complications ensue, alcohol will be indicated. Quinine has been highly recommended as an antipyretic in scarlet fever, but it is of little value in the majority of cases, simply disordering the stomach and irritating the kidneys if used in doses large enough to be effective. Where the head seems to be particularly hot and the fever is high, an ice-bag or a head-coil of rubber tubing is to be employed, and through the latter water may be circulated at whatever temperature is thought best. (See Cold, Part III.)

The treatment of the sore throat of scarlet fever is an important part of the care of the child in many cases. Small pellets of ice may be held in the mouth and an ice-bag applied to the outside of the throat. This is done by finely breaking up some ice and placing it in a thin india-rubber bag about the neck, the surface of the bag being covered by a cloth to prevent too rapid melting of the ice and the wetting of the clothes by the condensation of moisture on the surface of the bag. This treatment should be used during the entire attack if needed, and the contents of the bag renewed as often as the water becomes at all warm from the heat of the body. By this means the redness of the fauces and the swelling of the glands of the neck are prevented or relieved. Chlorate of potassium may be used in a spray or on a swab, but never internally, owing to its irritant effects upon the kidneys and stomach and its general influence on the blood.

In some cases where the eruption fades or is never very prominent it is of the greatest importance that it be made active. Under these circumstances the child may be placed in the warm wet pack, and, if the head is very hot, cold applied to the vertex and throat while the body is enveloped in the blanket. (See Heat.) This often brings out in an hour or two a bright scarlet rash, and the child falls asleep and wakes up free from delirium and high fever.

The itching and burning of the skin in many cases of scarlet fever are annoying symptoms, and they may become really dangerous. The author has recently carried out a series of experiments showing that fever of high degree can be brought on solely through nervous irritation, thus explaining a fact long well known to clinicians—namely, that the relief of this dermal irritation in scarlet fever may be followed by a fall of temperature. To relieve this symptom it will often be found advisable to cover the entire skin with a thin layer of vaseline or cosmoline or benzoated lard, or, in other cases, as an antiseptic and local anæsthetic, carbolized oil may be applied (2 drops of carbolic acid to each 2 ounces [0.1 : 64.0] of olive oil). In other cases almond oil should be used.

If nephritis comes on and is a pressing condition, the greatest care is necessary, and the object of the physician must be to make the skin, disabled as it is, carry out a sufficiently active eliminative function to relieve the kidneys of any strain, to remove dropsy, and to aid in the removal of effete matter by producing catharsis. Sweating may also be produced by the employment of heat obtained by the use of bottles of hot water or hot bricks placed about the patient, who is first wrapped in blankets, so arranged that sweating will come on, and so that the bottles cannot burn the skin. The thermometer must be placed in the mouth to foretell any danger from heat-stroke if the sweat should fail to appear. In such cases the hot pack is of great value. (See Heat.)

The after-treatment of scarlet fever during convalescence consists in the use of Basham's mixture or the tincture of the chloride of iron, and in the employment of simple bitters, strychnine, or quinine. Fresh air, sea-air or mountain-air is useful, while cold or exposure to cold air or draughts is to be carefully guarded against.

SCIATICA.

Sciatica is an exceedingly obstinate affection, in the majority of cases resisting the best treatment for weeks. It seems to be due to rheumatic taint in the majority of instances, and may sometimes be cured by the remedies used and described under the heading of Acute or Chronic Rheumatism. In other instances it is due to injury or jarring of the nerve, as by heavy persons stepping off from a high step to the hard ground. Thus the most obstinate case ever seen by the writer was one in which a stout man weighing about two hundred and fifty pounds acted as "coupler" on a switching engine, and, though wonderfully agile for his weight, provoked the disease in the leg on which he always first struck the ground when jumping from the platform of the moving locomotive.

The treatment for all cases is both internal and external. The internal treatment may be the same as that already described under Acute or Chronic Rheumatism, or in other instances consists in the use of large doses of bitartrate or citrate of potassium, 40 grains (3.0) three times a day, in plenty of water to aid in the maintenance of free kidney action. At the same time the amount of coffee and tea should be cut down as much as possible, and lemonade, strongly acid, be taken freely during the day. If the pain is very excessive, morphine should be given, or antipyrin or acetanilid may be used.

The local treatment of sciatica is quite various. One of the favorite methods is to inject deeply into the flesh, just over or about the exit of the nerve from the pelvis, 10 to 20 minims (0.65–1.3) of chloroform, or instead of the chloroform $\frac{1}{6}$ to $\frac{1}{4}$ grain (0.01–0.016) of morphine, in 30 minims (2.0) of water which has first been distilled and sterilized, may be used with equally good results and less danger of sloughing. Other physicians prefer acupuncture, the needle being driven down until the sheath of the nerve is punctured. Still another useful method is to take a strong glass rod with a round, smooth end, and, after anointing the skin over the course of the nerve with a little ichthyol ointment or lard, to pass the end of the rod back and forth over the tender area, using as much pressure as can be borne. By this means massage or pressure on the nerve is accomplished. In other cases the daily use of an ether or rhigolene spray over the part is effective, or kataphoresis may be resorted to. In still others, from three to five large wet or dry cups, preferably the wet, may be placed along the course of the sciatic nerve with great advantage. In many cases absolute rest of the limb, obtained by placing it in splints, has to be adhered to before cure can be possible. Hot-water bags should be placed continually about the exit of the sciatic nerve from the pelvis.

The liniments recommended in chronic rheumatism may be tried, and cod-liver oil is of service in obstinate cases. Sometimes nerve-stretching must be performed before a cure is effected.

SCLERITIS.

Scleritis, or inflammation of the sclera, consists in a bluish-red, somewhat elevated patch, with implication of the overlying episcleral tissue (episcleritis). In the earlier stages pain and photophobia, if present, require atropine and boric acid and compresses of hot water; later, the infiltration may be subdued with yellow-oxide-of-mercury ointment, associated with massage. If the disease spread and implicate the cornea and iris, the treatment useful in ordinary iritis is indicated. In stubborn episcleritis, without iritis, which does not yield to these measures, eserine, usually accompanied by pilocarpine sweats, should be tried, and even the actual cautery has been recommended. The disease in many instances is associated with rheumatism, syphilis, scrofula, anæmia, and menstrual disorders: these must always receive the needed constitutional treatment, especially if iritis or keratitis ensue. Scleritis is a disease hard to eradicate and subject to frequent relapses.

SCROFULOSIS.

Scrofulosis is to be treated by hygienic measures rather than drugs—fresh air, residence by the seaside, proper out-door exercise, massage, and dietetics, all of which take precedence of medicines.

If these necessary adjuncts to a cure are obtainable, the prognosis is fair, to say the least, and the following drugs may be used, all of them being devoted to the improvement of the general health, and not to any direct influence over the scrofulous tendency in itself. It is hardly necessary to state that cod-liver oil (or its supposed active principles combined under the name of morrhuol) is perhaps the best remedy of all. The oil should be given in emulsion, being first pancreatized and so prepared as to be somewhat palatable by the addition of flavoring substances if the child is old enough to appreciate such flavors. In young children, while distaste to the oil is often shown at first, a liking for it rapidly develops, so that the writer has seen children cry for it when the oil was discontinued. It is nearly always best to combine the lactophosphates or the hypophosphites with the oil when it is given in these cases. Whenever anæmia is present, syrup of the iodide of iron is useful in from 1- to 10-drop (0.05–0.65) doses, according to the age of the child, as follows:

℞.—Syrupi ferri iodidi . . . . fʒss vel fʒij (2.0–8.0).
Aquæ dest. . . . . q. s. ad f℥iij (96.0).—M.
S.—Teaspoonful (4.0) in water three times a day, after meals, to a child of one year.

In these same cases $\frac{1}{60}$ grain (0.001) of arsenous acid or $\frac{1}{100}$ grain (0.0006) of corrosive sublimate may be given to a child of three or four years, in the form of tablet triturates, or the following prescriptions may be used:

℞.—Liquor potassii arsenitis . . . . ♏xvj (1.0).
Aquæ destillat. . . . . f℥ij (64.0).—M.
S.—Teaspoonful (4.0) three times a day, after food.

Or,

℞.—Hydrarg. chlor. corros. . . gr. $\frac{1}{10}$ vel gr. $\frac{1}{5}$ (0.006–0.012).
Aquæ destillat. . . . . f℥ij (64.0).—M.
S.—Teaspoonful (4.0) every five hours, after food.

The use of the iodides is generally contraindicated in those cases where softening and breaking down of the glands are going on rapidly. In their place we may employ the phosphates of lime or sodium in from 1- to 2-grain (0.05–0.1) doses several times a day, and if suppuration is active the sulphurate of calcium, given by placing 1 grain (0.05) of it in half a tumblerful of water and giving a teaspoonful hourly. This mixture should be made fresh every day to prevent its becoming oxidized.

Where enlargement of the cervical glands takes place, iodine ointment, diluted, one-half of lard, should be well rubbed into the part twice daily, but it should be stopped at once if any signs of softening or fluctuation appear or if the skin becomes reddened. In cases in which these enlargements are persistent, ichthyol ointment is to be rubbed in, using the following formula:

℞.—Ichthyol. . . . . ʒij vel iij (8.0–12.0).
Adipis . . . . ℥j (32.0).—M.
S.—Apply locally.

If this is not followed by a cure, the glands should be excised or scraped and the cavity packed with iodoform, as in the majority of cases these enlargements will be found to be distinctly tuberculous. (See Adenitis.)

SCURVY.

Scorbutus is caused so frequently by dietetic lawlessness, and its cure is so completely dependent upon the use of proper foods, that almost no drugs are to be employed in its treatment. The avoidance of all salt meats, or, more important still, the avoidance of those foods, be they what they may, which have caused the disease in a given case, is to be practised.

The only remedies particularly indicated are lemon-juice or lime-juice or citric acid, the latter being far less valuable in all cases than the juice of the fresh fruit. Where lemon-juice causes indigestion this effect may be avoided by boiling the lemonade and allowing it to cool. The boiling precipitates certain poisonous and irritating albuminoids, and the supernatant liquid when taken away is devoid of any evil influence, and may be cooled and sweetened to suit the taste of the individual concerned. Arsenic and iron are of service in most cases, and rest and quiet are to be insisted upon.

By far the more common form of scurvy is seen in bottle-fed babie The child may or may not have rachitic manifestations. Generally loses animation, becomes listless and peevish, evidently suffers pa in its body and limbs when it is lifted from the bed, and looks feel and wan. The gums become spongy and swollen and have an ecch motic appearance, and light blows produce bruises out of proportion the severity of the injury. The treatment of infantile scurvy i complete rearrangement of the child's diet-list, and varying its fo No one baby food should be used to the exclusion of another, a sterilized milk is to be supplanted, if possible, by fresh new milk.

SHOCK.

The medical treatment of shock is very important, and the life of the patient depends upon the care exercised by the attendant; but be for describing the treatment it is in place to consider the causes of the co dition and the state of the injured person, so that we may understa the methods indicated. Every physiologist recognizes the fact th the body, particularly in its most vital parts, is controlled by inhibitory and accelerator nerves or nerve-cells, which govern the functions of all organs. Normally these two forces of inhibition and acceleration act in such a way as to be perfectly balanced, but abnormally they may either of them become excessive and overcome the other. Further than this, we must remember that all conditions of great functional activity are ultimately followed by a reaction which amounts to depression or exhaustion.

Shock consists in an over-stimulation of the inhibitory apparatus which governs the heart and respiration, ultimately followed by exhaustion of inhibition, so that the pulse and breathing become rapid and shallow instead of slow. Various degrees of shock can be readily recognized, and the severity of the condition always depends upon the constitution of the individual. Every one has heard a nervous woman say, "You frightened me so that my heart stood still," and again, a moment later, "Just feel how fast my heart is beating:" and we all of us know how any severe and sudden shock causes these changes to appear in the pulse to some degree. The same mechanism is the cause of shock in railway or other injuries, only it is much more severe, owing to the actual injury received and its accompanying terrors. Many of the readers of this book probably know that a violent blow upon the belly-wall just over the solar plexus will cause death even in so large an animal as the ox, and every boy has had the "breath knocked out of him" by a blow in this region.

This period of inhibitory excitement speedily gives place to inhibitory exhaustion, and we have a rapid pulse from inhibitory palsy, while through the palsy of the vasomotor system the blood-vessels are relaxed and the normal resistance to the heart is taken away. The heat beats wildly and fast for the same reason that a locomotive's wheels fly round when the track is slippery—or, in other words, normal resistance is lost.

The capillaries in this second stage of shock are dilated, and the skin is relaxed, moist, and cold from excessive dissipation of heat. This is the more prolonged stage of the two, but they both need active treatment.

The patient will rarely be seen in the first stage of shock, simply because by the time the physician reaches him the second stage will have come on. In either event the principal things to be done are the administration of $\frac{1}{60}$ to $\frac{1}{50}$ grain (0.001–0.0012) of sulphate of atropine hypodermically, and the application of external heat to maintain the bodily temperature, the fall of which is a factor of great importance, but generally overlooked in attending to an operation or other measures of relief. The use of atropine is peculiarly a triumph of experimental therapeutics and rests upon logical deduction. It will be remembered that atropine in full dose acts as a depressant to the vagus nerve, and, as this nerve is over-active in the first stage, the drug acts as a sedative to it. This is, however, a comparatively unimportant fact, for it is another action of atropine which makes it valuable. If the vagus be very much stimulated, a safe dose of atropine cannot quiet it, but in the second stage, which we most commonly have to treat, a safe dose does not act so much upon the vagus as upon the vasomotor system, and by preventing the dilatation of the blood-vessels of the body thereby provides blood-paths of normal tone and tenseness, which do not hold all the blood in stagnant pools where it is not needed, but carry it to the brain and vital parts. Digitalis is a useful adjuvant to atropine in the second stage of shock because of its powerful vasomotor and cardiac influence. 20 drops (1.3) of the tincture of digitalis should be given hypodermically, and repeated in an hour if the pulse does not show the influence of the drug at the end of that time.

The application of heat in the form of hot-water cans, hot bricks or bottles, must not be forgotten, care being taken that the patient is not burned. (See article on Heat, Part III.)

In many cases of surgical shock hypodermoclysis of hot saline solutions is of the greatest value, particularly if much blood has been lost. (See Hypodermoclysis, Part III.)

SMALLPOX.

The treatment of smallpox is not specific, simply because it is one of those diseases which run a given course and which we cannot abort. We can only treat the various symptoms which present themselves, and by the modification of these manifestations prevent complications and sequelæ to some extent. The fever is to be treated as is any fever of this class. Often it can be allayed by a mixture containing tincture of aconite, spirit of nitre, and spirit of Mindererus (liquor ammonii acetatis), while the headache or backache may be controlled by small doses of antipyrin or acetanilid. Mustard plasters are not to be used for the backache, as the dermal irritation will increase the eruption. Insomnia and restlessness, if excessive, are to be quieted by the bromides or chloral, care being taken that the doses of the latter are not large enough to depress the heart. It must be remembered that the time of onset of the secondary fever, the eighth day, is one of grave import to the patient. Before its arrival the treatment of the case must be so managed that strength is saved for this strain, and tincture of the chloride of iron, in 5- to 10- (0.3–0.65) or even 20-drop (1.3) doses, may be resorted to to give strength to the patient and to affect specifically the pyæmic fever. The pulse should be watched, and if it flags brandy and whiskey should be freely but wisely used. At the same time nourishment in the shape of eggnog, milk punch, or beef tea should be pushed as freely as the digestion will allow.

The peripheral irritation and itching of the eruption are a cause of the fever in part, and produce much unrest and nervous irritability. The condition of the skin is, therefore, to be looked after, and the pitting prevented, if possible, by every means in our power, particular care being taken to prevent its development on the face. One of the means which has been recommended to prevent pitting is the use of flexible collodion, and another application is glycerite of starch or simple cerate applied in a heavy coating. Some physicians recommend inserting the tip of a nitrate-of-silver stick into each vesicle as it ruptures, to prevent pitting. All of these measures are futile in most cases, and the use of collodion is probably harmful in some instances. The best application to use is made up of 4 parts of salicylic acid to 100 parts of vaseline or cold cream. Sometimes, anointing the entire body with sweet oil slightly carbolized (1 : 100) is useful to check irritation.

If the mouth is sore, a mouth-wash of chlorate of potassium and water may be used, flavored with a little tincture of myrrh.

Disinfection, good ventilation, and the avoidance of much light are necessary.

STINGS AND BITES.

The stings of nearly all small insects depend for their activity upon formic acid, and are to be relieved by the use of dilute alkaline liquids, or, better still, by the application of ammonia, or, instead, an application of ordinary or flexible collodion may be made, which is improved in its action by the addition of 1 part of mercury bichloride to 1000 of the collodion, or, if preferred, salicylic acid may be added in the proportion of 5 grains to the ounce (0.3 : 32.0). Sometimes a solution of carbolic acid, 1 : 100 or 1 : 50, when sponged over the parts exposed, not only relieves the itching of mosquito-bites, but keeps away the mosquitoes. In other instances the stings are relieved and cooled by the use of dilute or pure vinegar.

In snake-bite the best treatment is that introduced by Weir Mitchell and Reichert—namely, the local application of permanganate of potassium to the part, which should be thoroughly filled with the drug, and full doses given hypodermically about the wound, the salt being diluted three-fourths with water and followed by full doses of alcohol by the mouth. The secret of successful treatment consists, however, in the use of a ligature or a cleansing of the wound as soon after its reception as possible, thereby preventing the absorption of the poison.

STOMATITIS.

This annoying affection is most commonly seen in children, and is characterized by the appearance on the tip and sides of the tongue, lips, and lining membrane of the mouth of small spots which sometimes have a reddened zone around them, and which result in minute or large ulcers.

The best treatment, if the kidneys are not acutely inflamed, is the use of the following prescription, which largely depends for its value upon the potassium salt used:

℞.—Potassii chlorat. . . . . ʒj (4.0).
Tinct. myrrh. . . . . gtt. xx (1.3).
Elixir calisayæ . . . . f℥iij (96.0).—M.
S.—Teaspoonful in water every four hours.

As the chlorate of potassium is eliminated with the saliva, it not only does good when taken into the mouth, but is active all the time that it is being eliminated. If the stomach is disordered, the same preparation may be used as a mouth-wash. Often constipation will exist, and it should be removed by salines or by rhubarb in the form of the aromatic syrup. Another remedy which is very efficient in stomatitis is borax, used as a mouth-wash, in the strength of 10 to 15 grains to 1 ounce (0.65–1.0 : 32.0) of water and honey, as follows:

℞.—Sodii boratis . . . . gr. xxx (2.0).
Mel. purificati . . . . fʒiij (12.0).
Aquæ . . . . q. s. ad f℥iij (96.0).—M.
S.—To be used on a swab or as a mouth-wash overy four hours.

This also may be used internally in adults.

In many cases peroxide of hydrogen in the proportion of 1 ounce (32.0) of a 15-volume solution to 8 ounces (256.0) of water proves a valuable mouth-wash.

If the liver is at fault and is torpid, nitromuriatic acid is useful, and when the spots do not readily yield to treatment they may be touched with the tip of a stick of silver nitrate, which treatment, while it is momentarily painful, is very efficacious.

Nearly always with this disease in childhood there is considerable fever, vomiting, and wakefulness at night, with fretfulness and crying during the day, and total refusal of food, not because hunger is absent, but because the food hurts the mouth and is rejected with a cry of pain as soon as it touches the lips. The food should be very soft milk toast for older children, or milk with lime-water in it in large amount for infants fed by the bottle. If a child at the breast be attacked, the mother's nipple should be carefully washed with boric-acid solution after each nursing. A warm foot-bath at night is often necessary to produce rest, and 10 drops (0.65) of sweet spirit of nitre thoroughly diluted may be given with advantage to a child of one or two years. If the irritability of the nervous system is excessive, bromide of sodium or potassium in the dose of from 1 to 10 grains (0.05–0.65), according to age, three times a day, is of service, and may be added to the mixtures already named, or, better still, given alone, well diluted with syrup and water.

After the attack tonics and a carefully selected diet are generally necessary.

STYES.

Styes consist in a localized inflammation of one of the glands in the margin of the lid or the surrounding connective tissue. Before suppuration is established abortive treatment may be practised by an inunction with a salve of the red or yellow oxide of mercury (2 grains to 1 ounce [0.1: 32.0]), by painting the surface with an ethereal solution of collodion, or, according to Abadie, by the application of a saturated solution of boric acid. Pain may be alleviated with hot compresses (water 110° F.), frequently changed, and as soon as pus appears incision is necessary. Associated conjunctivitis requires a boric-acid solution for its relief. It should be remembered that styes indicate ill health, that tonics are indicated, and that they most frequently appear in the subjects of refractive error. When they tend to come in crops the internal use of sulphurate of calcium has been recommended.

SUNSTROKE.

Sunstroke—or, more correctly speaking, heat-stroke—is an affection produced by exposure of the body to any form of high temperature, whether the source of heat be the sun, a furnace, or the radiation of heat from the earth. For this reason the condition may occur as readily at midnight as at mid-day.

Heat-stroke is to be divided into two classes, in one of which excessive exposure to heat upsets the balance of the thermal mechanism of the body, so that fever comes on (thermic fever); in the other the temperature is lowered and forms the condition known as heat-exhaustion.

The condition of thermic fever is very frequently seen, while heat-exhaustion is rare.

The danger of thermic fever is that the excessive heat may cause coagulation of the myosin in the heart-muscle and of the protoplasm in the brain, and cause death, or that the same result may be reached by paralysis of respiration.

The danger of heat-exhaustion is that death may ensue from collapse due to a general failure of vital power and the chilling of the body. In heat-exhaustion, too, the vascular system is greatly relaxed and depressed, and the circulation is at its lowest ebb.

The treatment of these two states is, of course, radically different.

When a patient has thermic fever and is brought under the care of the physician, the first thing to be done is to loosen the clothing—if possible, remove it—and if the pulse be bounding, the face cyanotic, and the heart laboring, to freely bleed him. At the same time cold should be applied to the body, and particularly to the abdomen, back, and chest. Better still, the man should be stripped, laid upon a bed, which must be covered with a rubber blanket, and ice-water be applied to the body by means of a sponge, or a piece of ice may be laid on the belly, while another piece is rubbed over the rest of the body. While this is being done the surface of the patient's body must be thoroughly and briskly rubbed in order to bring the hot blood to the cooled surface.

Care should be taken that the temperature, when it once begins to fall, does not drop suddenly below the normal and cause collapse. If the clinical thermometer in the mouth or rectum shows that the temperature has fallen to 100.5° F. or 101° F., the cold application should be stopped, and the patient allowed to lie on the bed covered only with a thin sheet. The bodily temperature must be constantly watched, as it will probably bound up again in a few minutes, and require the application of more cold, used with the same care. This second rise is due either to the disorder of the nervous mechanism of heat-production and dissipation, or to the fact that, while the surface of the body is cooled by the ice, the innermost viscera are still in high fever and rapidly heat the surface as soon as the ice is taken away. Antipyretics have been found to be almost useless in the hyperpyrexia of sunstroke, and are not to be relied upon.

After the fever has been reduced permanently the danger is not all passed, and it is the greatest mistake to discharge a patient as cured at this time. After two or three days it is very common for a meningitis to develop, accompanied, it may be, by little or no fever, but characterized by violent darting headache, which is made worse on lying down or on sudden movement. The treatment of this state must be bold, and venesection is the only safe method of obtaining relief, although vascular sedatives, such as veratrum viride, may be employed. The bleeding should be copious enough to impress the circulatory system to some degree, and may be done by opening any of the prominent veins in the arm. (See Venesection.) Sometimes a violent attack of epistaxis saves the man's life, when it would have been lost through the ignorance of his attendant. If life is preserved without vascular depletion, secondary changes in the brain may ensue and produce hemianopsia, optic atrophy, imbecility, or insanity. Quinine, salicylic acid, and similar substances are all contraindicated under these circumstances, because of the congestion of the meninges to which they predispose by their physiological effcts.

The treatment of heat-exhaustion consists in the use of heat instead of cold, in order to restore the bodily temperature. Just here, however, must be uttered a word of warning—namely, that the mere fact that the skin is cold does not prove the case to be one of heat-exhaustion, since a rectal thermometer may show the central or real temperature of the body to be in a condition of hyperpyrexia. Of course such a case should not receive hot, but cold, rectal injections if the symptoms require it.

The bodily heat in heat-exhaustion is to be raised by placing the patient in a bath at 105° to 110° F., or by the use of hot bricks or bottles, care being taken that they do not burn the patient. The bodily temperature should also be watched, lest the other extreme of heat be reached.

Cases of heat-exhaustion are not so apt to have meningitis as are cases of sunstroke, but they are generally slow to convalesce, and require tonics and careful watching for a long time. Indeed, in many instances the system seems to receive a shock from which it takes several weeks or months or recover.

SYPHILIS.

In so far as the choice of drugs is concerned, the treatment of syphilis is exceedingly simple: iodine, iodide of potassium, and mercury practically represent the only remedial agents which are well proved to possess the power of distinctly counteracting the effects of the disease.

In regard to the method of administration and the period of the disease in which any or all of these drugs can be given to the best advantage there is a wide diversity of opinion. Following the teaching of Fournier, in this country the practice generally obtains of administering mercury on the appearance of the first symptoms of the secondary stage of syphilis; this drug is continued for from twelve to eighteen months, and is then followed by a course of iodide of potassium continued for from six to twelve months. If after the suspension of this treatment for six months no manifestations of disease appear, the patient is regarded as cured. Should the disease again break out, the iodides are administered in increasing doses, supplemented by the addition of mercury if necessary.

Against this treatment, however, there have been many and vigorous protests. Every syphilographer knows that the disease is frequently self-limited. Żeissl states that a large number of cases progress to spontaneous cure, and that the secondary eruption in such cases disappears in from two to eight months, after which time the patient is perfectly well, recidivity being far less common than when mercury has been employed in the early stages of the disease. The treatment by iodides, he thinks, should be commended chiefly after the expectant plan: their effect is not so rapid as is that of mercury; they are suitable, however, to all stages of the disease. When the symptoms become so urgent that it is no longer safe to depend upon iodides, mercurial inunctions should be employed, the dosage of the drug being regulated by its effect upon the symptoms, in all cases the minimum quantity necessary to accomplish the result being administered.

We have, then, three methods of treatment proposed, each advocated by a formidable array of authorities:

1. The expectant treatment.

2. The treatment by iodides, followed, if necessary, by mercury.
3. The continued treatment, beginning with mercury and ending with iodides or the combination of the two drugs.

By the expectant treatment is implied abstinence from all medication intended to directly counteract the syphilitic virus: if possible the patient should lead an active, out-of-door life, the diet should be most carefully regulated, and the treatment should be purely symptomatic, tonics being administered when required, the sore throat being combated by astringent gargles, particularly those containing chlorate of potassium or malic acid, together with direct local applications, while the eruption on the exposed parts of the body is controlled by the application of heat. Even in the mildest cases there is nothing to be said in favor of this treatment. Where the primary lesion is large and persistent; where the period of secondary incubation is less than seven weeks; where the papular eruption is universal, is confluent, and is accompanied by the simultaneous appearance of mucous patches; where the lymphatic enlargement is very marked and persistent; and where the disease attacks a depraved constitution,—the expectant plan offers little hope of accomplishing a cure. Here the second and third methods of treatment are absolutely indicated.

By the second plan of treatment the iodides are administered, not immediately on the appearance of the secondary eruption, but after this has run a course of several weeks and is steadily increasing in severity. The iodide of potassium is chosen by preference, beginning with the administration of 5 grains (0.3) three times a day, and increasing steadily 5 grains (0.3) a day until either the constitutional effects of the drug are manifested or the symptoms are favorably influenced. Should iodism appear, the dose is cut down one-half and continued for one or two weeks, after which, if the syphilitic lesions are not favorably modified, inunctions of mercury are employed, a drachm (4.0) of mercurial ointment being rubbed in every other day. The iodide should be continued for from six to twelve months after the disappearance of all symptoms, relapses being combated by temporarily increasing the dose and by a course of mercurial inunctions. If after the suspension of the treatment the patient remains free from all manifestations of syphilis for two years, he can be fairly considered as cured.

By the third method of treatment—and this is the method most commonly accepted in practice—the patient is placed upon mercury the moment the early secondary symptoms denote that the primary sore was surely syphilitic. Many surgeons begin this treatment from the time that the inguinal glands on both sides become characteristic in shape and size. Others wait until there is general lymphatic involvement, while others believe that the mercury should not be administered until roseola appears.

In regard to the particular preparations of mercury to be employed, the protiodide, blue mass, bichloride, and mercury with chalk represent the forms usually employed when the drug is administered by the stomach. Of these the protiodide is to be preferred, and the effort of the surgeon is directed first toward determining what is termed the "tonic" dose. With this end in view, $\frac{1}{4}$ grain (0.016) of the protiodide of mercury is given, in pill form, three times a day, and every second day this quantity is increased by one pill, the patient being meanwhile carefully watched. The drug usually manifests its physiological effects by griping pains accompanied by two or more watery passages from the bowels, or by fœtid breath and slight tenderness of the gums. The quantity taken to produce this effect represents the extreme limit to which it is safe to push the drug. If this dose is continued or increased, the characteristic symptoms of mercuric saturation appear. When the surgeon has determined the limit to which the drug can be safely pushed, this dose is cut down one-half, and in the absence of further complications the patient is directed to continue with this dose for eighteen months. If during this time local symptoms appear which show that the disease is not thoroughly under control, the mercury must again be pushed to the full dose, being reduced to the tonic dose as soon as the disappearance of specific lesions permits of this. Where comparatively small doses of the protiodide produce pain and purging, opium may be added; in this case the breath and the mouth will show when the full effect of the medicine is obtained. Manifestations of the disease occurring during mercuric treatment must receive local treatment. The surface eruption is combated by mercuric ointments and washes and by the application of heat. (See Heat.) Mucous patches in the mouth are quickly healed by applications of solid nitrate of silver or sulphate of copper, 20 per cent. chromic-acid solution, or the acid nitrate of mercury. When these patches occur about the genitals, washing with 1 : 2000 bichloride solution and dusting with calomel and bismuth will be found satisfactory. Alopecia is combated by shampooing and by the application of strong stimulating lotions containing croton oil or tincture of cantharides.

The intense cephalalgia is combated by $\frac{1}{6}$-grain (0.010) doses of calomel, repeated every two hours. The periostitis yields most readily to gentle, long-continued mercuric inunction, supplemented by the application of pressure bandages.

When the integrity of any vital organ is threatened there should be no hesitation in pushing the mercury treatment, and in supplementing it, if favorable results do not follow promptly, by large doses of iodide of potassium.

After the first eighteen months iodide of potassium is generally indicated. This is commonly given together with the mercury, constituting the mixed treatment. The following formula, or one similar to it, may be employed:

℞.—Potassii iodidi . . . . ʒij vel ʒiv (8.0–16.0).
Hydrarg. chlor. corros. . . . . . . gr. ss (0.03).
Syrup. aurant. cort. . . . . . f℥j (32.0).
Aquæ . . . . q. s. ad f℥ij (64.0).—M.
S.—Teaspoonful (4.0) three times a day.

When this prescription is put up a precipitate is formed and then dissolved.

This mixture, or iodide of potassium without the mercury, administered in 5- to 10-grain (0.3–0.65) doses three times a day, is given for from six to twelve months longer. When the iodide is given alone it is most conveniently administered in the form of a saturated solution. Of this a drop contains a grain of the salt. Milk seems to have the power of completely disguising the disagreeable taste of the drug. Thereafter, specific treatment is stopped, unless symptoms arise, in which case it should be renewed and should be continued for many months.

The protiodide is usually preferred, because the symptoms of its constitutional effect are manifest at first by looseness of the bowels, and because in practice it has been found one of the most satisfactory of all preparations. Where this form of mercury is not well borne the physician should at once employ some other salt; the bichloride, in $\frac{1}{12}$-grain (0.005) doses three times a day, is efficacious. Blue mass will often act favorably when other preparations cannot be tolerated. Its combination with iron is desirable, and the following formula represents one of the most valuable of the antisyphilitic pills:

℞.—Mass. hydrargyri . . . . gr. xxx (2.0).
Pulv. ferri chloridi . . . . gr. xv (1.0).—M.
Ft. in pil. No. xii.
S.—One three times a day.

Where mercury cannot be administered by the mouth it may be given by means of vapor-baths, by inunctions, and by hypodermic injections. The vapor-baths are useful when it is desired to promptly cure eruptions on the surface of the body or when it is most important to bring the disease quickly under the influence of mercury. They are readily administered, the only apparatus required being an alcohol lamp and a plate in which the mercuric preparation can be volatilized. The patient is seated in a chair entirely naked; several blankets are wrapped around his neck, and beneath the tent thus formed a large vessel of steaming water is placed. When the skin is thoroughly softened $\frac{1}{2}$ drachm (2.0) of calomel is sublimed by means of the lamp. These baths may be repeated every night until the mercuric fœtor of the breath is observed or until the specific symptoms disappear. (See articles on Mercury and on Heat.)

Inunction represents the most efficient way of administering the mercuric treatment. When the stomach is intolerant of drugs, or when, administered by the mouth in full doses, they do not favorably modify the symptoms, inunctions are indicated. The patient is instructed to take a warm bath, and the mercury is then well rubbed in over the inner surface of the forearm and arm and along the side of the chest for fifteen minutes. Either the oleate of mercury, 10 per cent., or the ordinary mercury ointment is commonly employed; the former is more cleanly, but less efficient. The rubbings should be done by the patient, should be made over a large surface of the body, and should be performed thoroughly; 1 drachm (4.0) of blue ointment is rubbed in daily. A shirt kept for this purpose is then put on next to the skin, and the ordinary clothing is worn over this.

The next night the opposite arm and side of the body are utilized as the seat of inunction; the following night the right groin and the inner surface of the right thigh and leg; next, the same regions of the opposite side of the body; finally, the anterior surface of the chest and abdomen. In this way irritation of the skin is avoided. Where it is impossible to employ the inunctions in this way, another means of causing absorption of mercury through the skin, suggested by Sturgis, will be found satisfactory: After a thorough soaking of the patient's feet in hot water, from ½ to 1 drachm (2.0–4.0) of a 20 per cent. oleate of mercury is rubbed vigorously into the sole of one foot; the next night the sole of the other foot is treated in the same way. The patient is directed to wear, night and day, a pair of woollen socks; these are not changed for one week. Mercury may be taken by the mouth at the same time inunctions are employed when it is desired to influence the system quickly. In the late periods of the disease very striking effects are often obtained by supplementing the iodide treatment by a course of twelve to eighteen inunctions.

The hypodermic administration of mercury is in this country limited to those few cases which do not seem to respond to the drug when given by the mouth or by inunction. Although many preparations of mercury have been lauded as most efficacious when used hypodermically, the best formula seems to be that recommended by Hebra. This consists of a solution of 1 per cent. of bichloride of mercury in a 6 per cent. sodium-chloride solution; the resulting mixture is perfectly clear and is readily prepared. If it becomes turbid it should be thrown away. Most rigid antiseptic precautions must be observed, as abscess-formation is not uncommon. One injection is given daily, from ⅙ to ⅓ grain (0.01–0.02) of the sublimate being administered. The nates are selected as the seat of the injection, the solution being driven well into the muscles of each side every other day. Twenty injections are usually sufficient to cause the disappearance of all symptoms. The employment of the insoluble preparations of mercury, particularly of calomel, gives much pain, frequently causes abscess, and is at times attended by a continuous absorption which may produce severe and even fatal ptyalism.

The ulcerations often found as tertiary manifestations of syphilis are treated according to general surgical principles. The local application of mercuric preparations is of less service than during the existence of the secondary lesions. Iodoform is peculiarly serviceable.

The tonic and general treatment of syphilitic cases must not be forgotten; fresh air, exercise, bathing, careful diet, regular living, all must be enjoined. Moreover, in certain cases where there is marked anæmia or physical weakness cod-liver oil, stimulants in moderation, compound syrup of the hypophosphites, and other tonic and nutritive courses of treatment must be carefully administered.

Although the treatment of an ordinary case of syphilis is simple and satisfactory in its results, it must be remembered that there are malignant forms of the disease, attacking by preference feeble and cachectic individuals, running a rapid and virulent course, unchecked, nay aggravated, by specific treatment, and responding feebly, if at all, to the most careful hygienic and tonic regimen. In such cases a strong extract of sarsaparilla is sometimes of service.

TETANUS.

The treatment of tetanus is quite independent of its causation, so far at least as drugs are concerned, and is virtually identical with that of Strychnine Poisoning, to which the reader is referred. It is stated that Fowler's solution acts almost as a specific in some cases. (See Nux Vomica.) The value of the antitoxin for tetanus has not been sufficiently studied as yet to justify its general employment.

TONSILLITIS.

Inflammation of the tonsils occurs in three forms: superficial tonsillitis, in which the mucous membrane covering the tonsils becomes inflamed through extension of a pharyngitis; follicular tonsillitis, in which the follicles are chiefly involved and pour out an excessive secretion; and, finally, true tonsillitis, in which the gland itself suffers from severe, widespread inflammation phlegmonous in type. In all these forms the treatment to be instituted at the beginning is practically identical. The bowels should be opened by a saline purgative, which in some cases should be preceded by small doses of calomel, the diet should be liquid and nutritious, and a fever and diuretic mixture should be given freely as follows:

℞.—Tinc. aconiti . . . . ♏xij vel xxiv (1.0-1.6).
Spt. ætheris nitros. . . . . f℥j (32.0).
Liq. potassii citratis . . . q. s. ad f℥iij (96.0).—M.
S.—Dessertspoonful every three hours.

Locally, a solution of nitrate of silver, 60 grains to the ounce (4.0 : 32.0), should be applied with a camel's-hair brush or with a cotton applicator. Externally, an ice-bag should be applied about the throat, and as soon as the purgative has acted and the fever is reduced by the mixture just given, full doses of the tincture of the chloride of iron should be administered (20 drops [1.3] every three or four hours), in plenty of water, which preferably should be Vichy or one of the good lithia waters.

In inflammatory involvement of the entire tonsil active scarification in the early stages may be of service in limiting the severity of the attack. In some instances hot fomentations about the neck and hot gargles seem to be more beneficial than the use of ice. Often a mild antiseptic gargle of carbolic acid (1 : 100 of water) will relieve the pain and the fœtor of the breath.

Finally, it should be remembered that rheumatic persons suffer severely at times from tonsillitis, and the best remedies for this form of tonsillitis are the salicylates or guaiac.

TUBERCULOSIS.

Under this head will be considered pulmonary tuberculosis as a type of all forms of this morbid process. Its treatment may be placed in two lines—the first devoted to the cure of the disposition or inclination toward the disease or the abortion of its early stages; the second directed to the improvement of the patient's condition, so that his progress through the disease may be made as comfortable as possible. Before doing this, however, it is proper to state that prophylaxis, or true prevention, is the object really to be sought after, although it is certainly true that many cases of early tuberculosis.are curable. Recent studies have shown most conclusively that tuberculosis is capable of being transmitted from man to man if air laden with the bacilli is breathed, and if the lungs are in a fit state of depressed vitality, from any cause, to afford a favorable field for the growth of the germ and the development of its poison.

Cases of pulmonary consumption follow, rudely speaking, four well-defined lines. A very early stage sometimes comes to the care of the physician, and it is that in which the following history is given or a similar story is elicited. A patient, previously strong and well or of poor health, as the case may be, begins to lose vivacity. Life becomes a burden and exercise is distasteful. A slight daily chill, in morning or evening, and fever develop, and the physician who is careless treats the case as one of mild malarial poisoning. Careful examination, however, will show an area in the lung, generally near the apex on one or both sides, where slight prolongation of expiration with a harsh inspiratory sound is heard, and where percussion will give impaired resonance or dulness. In other words, the first stage of phthisis is present, and the physician must resort at once to those active measures for the patient's relief which will be considered in a moment.

In another form a chill, a sweat, a loss of flesh and vigor, with, more prominent than all, a hard cough, sudden in its onset and rapidly becoming excessive with profuse expectoration, are the dominant symptoms. The wasting is extraordinary, the sweats are constant, and death may come in a few weeks. This is the form known as "galloping consumption."

The third variety is ushered in by a gradual loss of vigor or a sensation of being a little unwell, or is brought before the patient's mind by a sudden acute hemorrhage, or several hemorrhages rapidly succeeding one another. This variety passes along its course more or less rapidly. Sometimes death soon ensues from a fatal hemorrhage; in other cases the disease keeps on for months and the case dies from exhaustion.

Last of all, the fourth class is made up of persons who gradually pass from bad to worse: First, they "catch a cold," which hangs on longer than it ought, and, as soon as they are well, this is followed by another one, which is found more difficult to cure, until finally there is always a cough. Soon wasting comes on, strength is lost, and a long period of months or years ensues during which the progress of the case is now slow, now fast, the condition now better, now worse, until death ensues from wasting, pneumonia, or some other complication.

These forms and stages have been roughly outlined, so that a discussion of their treatment might be taken up with a clear idea of what is to be done.

When a patient exhibits those physical signs which have been given as evidences of the early beginnings of phthisis, the physician should institute certain hygienic and medicinal measures. If the individual be earning a livelihood by following some confining occupation, this occupation must be given up and one undertaken which is carried on in the open air and yet not accompanied by too great exposure. Even if exposure is incurred, it is better than the occupation previously followed: thus, if the patient be a bookkeeper, a printer, or a bookbinder, or a clerk kept much at a desk in an ill-ventilated room, a few wettings in the rain will do little or no harm if the patient is properly protected by the wearing of flannel shirts, which, when wet, are changed as soon as labor ceases, as under these circumstances the danger of catching cold is at a minimum. (See Part III., article on Climate.)

The medicinal measures to be carried out in all cases of phthisis, except that known as the galloping form, are not numerous if we confine ourselves to the modes possessing any real value. For many years cod-liver oil has been sadly abused in the management of these cases, and has been given at all stages, owing to ignorance of its proper use as a general rule. The writer believes that the following rules are never to be departed from:

1. *Never use cod-liver oil where the disease has passed the primary stages of thickening of the lung and roughening of the respiratory sounds, unless fibroid changes are going on and the changes are very slow indeed.*

2. *The use of cod-liver oil when rapid degenerative changes are occurring in the lung is distinctly harmful, as it is not of any service, disorders the digestion, and destroys the appetite.*

When the oil is used it should be given as directed in the article on Cod-liver Oil.

A remedy of some value as a curative and of great value as a palliative is creosote, first introduced by Bouchard some thirteen years ago, but only recently widely employed. Many cures have been claimed from its use in the early stages of phthisis, and it has been highly lauded by a number of European clinicians. In the author's experience it is merely a palliative to the cough and general discomfort, particularly when the disease is fully established, and the opinion expressed by Strümpell expresses so well the thought which the author was about to write when he read Strümpell's article that his words are here given: "Taking it all in all, we find that creosote, even in large doses, has no injurious effect on tuberculosis. At times we notice an apparently favorable symptomatic effect. We failed, however, to observe any real influence exerted by creosote on the progress of the disease."

On the other hand, the relief of some distressing symptoms produced by creosote is never to be underrated. (See Creosote.)

When creosote is used internally it may be given in the following formula:

℞.—Creosoti (beechwood) . . . . . . gtt. xxxij vel fʒj (4.0).
Tr. gentian. . . . . fʒj (4.0).
Alcoholis . . . . f℥j (32.0).
Vin. albæ . . . . q. s. ad f℥iv (128.0).—M.
S.—Teaspoonful (4.0), in water or wine, three times a day.

Better still, order in ascending doses (1 minim extra each dose) in milk or wine.

Often a 1-drop (0.05) dose three times a day may be increased to 5 drops (0.3) in the same period with advantage, and if given in ascending doses the author has frequently had patients take as much as 90 minims (6.0) a day. Sometimes 1 or 2 drops (0.1) in capsules are as useful as the formula just named. (For methods of administration see Creosote; also, see Guaiacol and Creosote Carbonate.)

Creosote may also be inhaled in the spray from a steam atomizer or by means of an inspirator fitted over the nose and mouth and made of perforated zinc with a sponge at the edge to hold the drug. A very good method is to wet the sponge with creosote, alcohol, and water, equal parts, or to use the creosote alone if coughing is not too severe. Another useful mixture consists of equal parts of terebene, iodide of ethyl, and chloroform. This last mixture is most useful when the secretion is tough and tenacious, and should not be used in the presence of acute irritation due to inflammation. Such inhalers are very cheap, not easily broken, and readily worn.

If the cough in phthisis is excessive, a little spirit of chloroform placed on the sponge of the inhaler will often relieve it, or a mixture of morphine and wild-cherry bark may be given as follows:

℞.—Morphinæ sulph. . . . . . . gr. j vel ij (0.05–0.1).
Syr. pruni Virginianæ . . . . . . f℥iij (96.0).—M.
S.—Teaspoonful (4.0) every three hours.

Or the following:

℞.—Spt. chloroformi . . . . f℥ss (15.0).
Morphinæ sulph. . . . . gr. j vel ij (0.05–0.1).
Syr. pruni Virginianæ . . . . . . f℥iij (96.0).—M.
S.—Teaspoonful (4.0) every four hours.

In still other cases 2 to 10 minims (0.1–0.65) of a good fluid extract of cannabis indica, or $\frac{1}{8}$ to $\frac{1}{4}$ grain (0.008–0.016) of the solid extract, will act with surprising benefit and stop the cough.

Very often during the course of phthisis localized spots of pleuritic inflammation arise. Without the occurrence of any exposure the patient will remark, "Doctor, I think I have taken a little more cold, and I have a stitch here in the chest." The best treatment is to apply a small blister or to paint the spot with iodine.

(For the treatment of Hæmoptysis see Hemorrhage.)

Laryngeal phthisis, one of the most serious complications of this disease, is best prevented by ordering the patient to inhale the steam arising from boiling water which contains corrosive sublimate in the proportion of 1 : 10,000. If a proper watch is kept for evidences of a general mercurial effect, and this measure stopped at once when tenderness of the gums appears, no danger exists. Before the inhalation takes place a spray of cocaine (4 per cent. solution) should be thoroughly used.

The treatment of laryngeal phthisis itself is various. The best method is that in which lactic acid is used. By the aid of a laryngeal mirror and a cotton applicator a 10 per cent. solution of lactic acid is applied to the spots which are involved. As this is generally quite painful, cocaine solution should first be used. Gradually the strength of the lactic-acid solution should be increased to 60 per cent. if the weaker solutions do not check the disease. Very valuable results have been obtained by this method.

The second method in point of value is that of iodoform insufflations. A powder of iodoform alone is too light for satisfactory propulsion into the larynx, and powdered talc should be added to it in small amount, as may also $\frac{1}{16}$ grain (0.004) of morphine to each drachm (4.0) of iodoform. The odor is generally disagreeable to the patient, but if a cocaine spray be first employed and the operator is skilful, very little coughing is produced. As iodoform is a local anæsthetic, it relieves the pain in the larynx, acts as an antiseptic and alterative, and is peculiarly obnoxious to the bacillus tuberculosis.

When the night-sweats are very profuse, hypodermic injections of atropine in the dose of $\frac{1}{150}$ to $\frac{1}{100}$ grain (0.0004–0.0006) are useful in some cases, and the efficiency of this treatment may be increased by the use of an alum sponge-bath at bedtime. A solution of alum, 10 to 20 grains to the ounce (0.65–1.3 : 32.0), may be sponged over the body, or sulphuric acid may be added to water in the proportion of 1 drachm to the pint (4.0 : 500 cc.), and used in the same way as the alum solution.

Sulphuric acid is often given internally with advantage in these cases of sweating. Small doses of pilocarpine amounting to $\frac{1}{20}$ grain (0.003), given from one to two hours before the sweat is expected, are sometimes potent for good. The means by which this result is brought about are not far to seek. The drug in any dose causes great stimulation of the peripheral ends of the nerves supplying the sweat-glands. In many instances we find excessive secretion dependent upon depression of function, as in a serous diarrhœa or a local sweating of the feet. These states pass away just as soon as the parts regain their normal tone through proper treatment. The night-sweats of phthisis are sometimes improved by pilocarpine, because this drug in all doses stimulates the sweat-glands. In large doses this stimulation amounts to free diaphoresis; but in the minute doses, such as $\frac{1}{40}$ to $\frac{1}{20}$ of a grain (0.0016–0.003), the stimulation just balances the depression and a normal tone is acquired. While it is true that pilocarpine and atropine are physiological antagonists, it will be found practically beneficial to prescribe small doses of both in such cases as refuse to respond to either one alone, as by their antagonism they prevent over-action on other parts of the body, and both act in harmony in so influencing the sweat-glands as to be of service to the patient. Camphoric acid in 20- to 30-grain (1.3–2.0) doses is the best remedy and is invaluable in treating night-sweats.

TYPHOID FEVER.

Any attempt to review the treatment of the disease known as typhoid fever would be absolutely impossible, owing to the very numerous theories and practices put forward by various clinicians. What is said under the general heading of Fever and under the consideration of Cold, and also under Antipyrin and Acetanilid, gives sufficient information as to the treatment of febrile movements, and the care of the patient beyond this point in nearly all cases depends upon the severity of the attack.

Before going further, however, the writer desires to insist very strongly upon one fact—namely, that a case of typhoid fever is not curable in any degree. No remedy yet found, except it act through the prevention of complications, can shorten its course. We can only guide the patient safely to health when the storm of disease comes on, and we cannot stop the storm.

Not only should the facts of the last paragraph be carefully borne in mind, but the physician must remember that he is treating an exhausting disease—not a disease which runs a violent course for a few days and strands the patient sick and weak, but convalescent, upon the shores of health, but one in which, after sapping the strength for weeks, some sudden intercurrent malady or accident may ensue which will speedily kill him if every grain of strength is not preserved for the struggle. The physician should always put every case in which there is a suspicion of typhoid fever to bed at once, and keep the patient there till the disease has passed or fails to appear. Every muscular movement unnecessarily made is a waste of force, and, in consequence, everything should be done for the patient, and not by him. A bed-pan should always be employed, the patient not being allowed to sit erect upon a commode. Remembering, too, the force consumed in difficult digestion, the food should be liquid, free from fat, and consist solely, if not entirely, of milk, and during convalescence of an egg or a little arrowroot or corn-starch. Not only is this recommendation practically correct at the bedside, but it is well based on scientific fact, for Brieger has shown that typhoid bacilli do not readily reproduce themselves and their poisons in peptone and well-digested milk, but do so very actively in meat-broths or jelly which has not been acted upon by the digestive juices. He has also found that these bacilli generate two poisons, one of which causes, when given to animals, salivation, paralysis, and diarrhœa, the other violent and exhausting diarrhœa alone. Milk diet is therefore evidently better than broth diet in typhoid fever, and we once more are able to explain an empirical fact by a scientific discovery. Another reason for using liquid instead of solid foods, beyond the difficulty of digestion, is the fact that these solids may irritate or perforate the ulcers in the small intestines.

Alcohol may be used in all stages as a stimulant, as a giver of force to the system, and as an aid to digestion. A very large part of the profession believe that the mere presence of an abnormally high temperature contraindicates the use of alcohol. Mere high temperature does not do so, however, and it seems probable that many deaths have resulted from putting into practice such a belief. High temperature of a sthenic type, with a full, tense, bounding pulse and all the signs of a disease attacking one in the full vigor of life, of course precludes its use; but in the high temperature of advanced typhoid, with the marked asthenia often present in that stage, alcohol should be given constantly in large amount. Under these circumstances the tissues which the man can afford to lose are gone, and much of the vital portion of his system is greatly encroached upon: the alcohol yields force to the body, and is burnt up in great part, keeping the flagging heart pumping the tides of blood through the lungs and systemic circulation, when otherwise the very cardiac depression would produce hypostatic congestion, if not more widespread circulatory disorder.

A no less useful and valuable result obtained by the use of alcohol in the early stages of exhaustive fevers is the part that it plays in aiding digestion. The writer has elsewhere defined the difference between the influence of alcohol in the artificial digestion of the test-tube and that occurring in the stomach. No one doubts that alcohol added to a small amount of gastric juice in the test-tube retards or prevents its action; but evidence is abundant to prove that the ingestion of this drug produces by its stimulating and irritant action a very decided increase in the quantity of gastric juice secreted over and above the amount normally present. Aside from experimental evidence, every-day experience has taught the *gourmand* that alcohol, in a fairly concentrated form, enables him to digest an amount of food which under ordinary circumstances would remain unchanged in his stomach.

The importance of aiding the flagging powers of the stomach is not generally recognized; but if one remembers the fact that at one time during the course of a severe attack of typhoid an occasion must come when a struggle between the few remaining grains of strength and the disease results in death or in recovery, its importance becomes evident. By the ingestion and digestion of more food early in the attack a larger amount of vital force remains for use at a crisis, and the chances of a recovery, to say the least, are increased. Alcohol may therefore be used all through the ordinary exhausting fevers—for the purpose in the first stage of aiding digestion, and in the later stages of supporting the system; but the physician ought not to use it as a routine measure in every case without a rational idea of why he does so, nor without a clear idea as to what indication is met by its use.

In those cases in which a temporary loss of heart-power is due to hemorrhage or to some sudden severe depression alcohol is one of the remedies to be employed—in a hot and concentrated form.

That alcohol may be misused and cause great harm is of course known to every practitioner of medicine. So long as it reduces the temperature and lowers the rate of the pulse, causes a moist skin and tongue, and quiets nervous twitchings, it does good, and only up to this point is it to be employed. If its administration is pushed after this, the tendency to adynamia becomes, under the over-use of the drug, one of dynamia; the pulse is no longer soft, but comes in angry, bounding beats; the nervous symptoms change from low, weak, muttering delirium, with subsultus tendinum, to wild, incoherent callings and strong tossings to and fro; and by and by, when the influence of the alcohol begins to decrease, and even before this time, the system has put forth the strength of days in a few hours, and the man, having no reserve strength, is dead.

The treatment which has been used by the author in his wards at the Jefferson Medical College Hospital and St. Agnes's Hospital have given him results which the application of other methods have failed to give, and is as follows:

As soon as the patient enters the house he is washed or bathed and placed in bed, and required to remain there. He is assured that the more quietly he lies the more mild and safe will be the course of his attack, and is made to use a bed-pan and urinal, and never allowed to get up. He then receives several small doses of calomel, and when this has had time to purge him is also given 5 drops (0.3) of dilute hydrochloric acid in a wineglass (32.0) of water every four hours, or, if the bowels are not active, nitro-muriatic acid is substituted therefor, care being taken to employ 1, 2, or 3 drops of the strong, freshly-mixed orange-colored acid according to the degree of coating of the tongue. The diet is strictly a milk diet—namely, a quart to a quart and a half (1 to 1½ litres) a day, with a little salt to flavor it, as already described in the article on Indigestion. In some cases koumyss acts very much better than milk. Sometimes, if vomiting is threatened, lime-water is added or the milk is peptonized, or beef-tea is temporarily employed. In other instances the milk agrees with the patient if it is partly diluted with plain soda or Apollinaris water.

For the dry and sordes-covered tongue a mouth-wash of glycerin and water, half and half, to which may be added a little lemon-juice, is used. If constipation is very obstinate and continues over two days, an injection is employed, and if this, after being used twice, fails to act, a dose of calomel, ⅙ grain (0.001) every fifteen minutes till a grain has been taken, is prescribed, and, if no movement occurs in twelve hours, is followed by ½ an ounce of sulphate of magnesium, or, best of all, a teaspoonful of licorice powder is given. In other cases small doses of cascara sagrada are equally useful.

When diarrhœa becomes troublesome, that is, over four or five passages a day, the following will be of service:

℞.—Acid. sulph. aromat. . . . . fʒij (8.0).
Extract. hæmatoxyli fl. . . . . fʒiij (12.0).
Syr. zingiberis . . . . f℥iij (96.0).—M.
S.—Teaspoonful (4.0) in water every hour until relieved.

Should the stools be excessively fœtid and tympanites be marked guaiacol carbonate may be given as an intestinal antiseptic, or, so soon as any evidence of tympanites or much meteorism comes on, turpentine may be given, as follows:

℞.—Ol. terebinthinæ . . . . fʒij (8.0).
Syr. acaciæ . . . . q. s. ad f℥iij (96.0).—M.
Ft. in emulsio.
S.—Teaspoonful (4.0) three times a day.

At the same time it is well to employ a turpentine stupe over the abdomen. (See Turpentine.) Where the tympanites is excessive it may be relieved by an injection made up as follows:

℞.—Ol. terebinthinæ . . . . fʒj to ij (4.0–8.0).
Ol. olivæ . . . . f℥iv (128.0).
Mist. asafœtidæ . . . . Oj (500 cc.).—M.
S.—Use as an injection. Shake well before using.

In the later stages of typhoid fever, as convalescence is approached, turpentine is invaluable, as it causes rapid healing of the intestinal ulcers and stops diarrhœa, preventing relapses through the absorption of poisonous materials from the unhealed intestinal lesions.

For a number of days after the patient begs hard for solid food it should not be allowed, for he will ask for it long before he should have it, but if the temperature remains normal for five days, very soft-boiled rice may be used in broth. Sometimes "curds and whey" make a pleasant change in the diet.

The complications of typhoid fever of the most serious import are hemorrhage from the bowel, pneumonia and pleurisy, and perforation of the bowel.

The hemorrhage from the bowel may be stopped as indicated under that heading (Hemorrhage), and the pneumonia or pleurisy should be treated as are these diseases when free from complications; but it is to be remembered that this is an *asthenic* or *adynamic case*, which must not be *bled or depressed, but stimulated.* When perforation of the intestine appears, large doses of morphine should be given to relieve pain, prevent collapse, and allay irritation. Warm applications should be used over the belly and down the limbs, and stimulants given if needed. Probably in the future surgery will add another triumph to the art by devising some fairly safe plan of operative interference in this accident, which, if left alone, is very often fatal.

The method of cold bathing introduced by Brand has given such wonderful results in the treatment of typhoid fever, and has been so thoroughly tried, both in this country and abroad, that its application should be well understood and practised whenever it is possible to do so. The method consists in immersing the patient every three hours in a bath at a temperature of 85° F., or as low as 75° F. if necessary, and allowing him to remain in the water until his temperature falls to 100.5° or 101°, the bath being used with the frequency named as long as the temperature is above 102°. Before entering the bath it is well to give the patient ½ to 1 ounce (16.0–32.0) of whiskey in a little milk or water, to prevent any depression from his being moved into the tub. The patient will generally complain bitterly of the cold, particularly at first, and will also appear somewhat blue and chilly after the bath, but these signs are not to alarm the physician unless there is prolonged and persistent coldness, when hot bottles should be applied to the feet and in some cases a little whiskey or brandy administered. When the bath is given, cold should be applied to the vertex to prevent a congestion of the head, which, of course, is not under water. The patient should either be immersed or the directions given in Part III. in regard to the use of the cold pack be followed. The bath ought always to be near the bed, and a sufficient number of assistants should be present to lift the patient without his putting forth any exertion whatever, as this consumes his strength, which must be preserved with the greatest care.

During the time the patient is in the bath the nurse should rub the surface of the body briskly in order to bring the blood to the surface and prevent congestions in internal organs. In cases where the patient objects so strongly to the cold bath that the physician cannot insist on it, it is sometimes possible to have the objections removed by putting the patient in the water at 95° F., and cooling the bath by the gradual addition of cold water to 75° F.

It is said that pneumonia, intestinal hemorrhage, menstruation, nephritis, and cardiac complications are none of them contraindications to this method of Brand, but the author would not resort to it if any of these conditions were actively present.

One fact more should be stated—namely, that this method, while not wholly doing away with all other treatment, generally makes other measures unnecessary, although it is, of course, advisable to move the bowels every few days, if constipation be present, by injections, and to peptonize the milk if the digestion is faulty.

The advantages gained by Brand's method are a mortality very much less than that of any other known method, the absence of high fever, the avoidance of disagreeable complications of *all kinds*, and the production of a rapid convalescence.

URÆMIA.

The treatment of this dangerous manifestation of renal disease is often futile, but always to be resorted to with the recollection that wonderful recoveries sometimes occur under judicious management. It matters little whether the onset of the symptoms has been gradual or instantaneous: in either event the prime endeavor must be to rid the system of the poison which is threatening life. This can only be accomplished by aiding its elimination through the bowels, skin, and kidneys. The second indication is to support the vital organs until the emunctories have had time to act. Often this second indication will be more pressing than the first, and the physician will have to give stimulants at once. The third indication is to arrest any convulsive seizures.

The methods to be resorted to for the elimination of the uræmic poison are external and internal, externally the hot pack being resorted to to increase the activity of the skin. (See Heat in Part III.) Internally we give elaterium or elaterin in the dose of $\frac{1}{6}$ grain (0.01) or $\frac{1}{16}$ grain (0.004), respectively, for the induction of watery purging, which at once aids elimination through the bowel and relieves dropsy if present. The elaterin should be dissolved in a few drops of alcohol or in whiskey. The medication directed to increased action of the skin should consist of small doses, hypodermically—say $\frac{1}{6}$ grain (0.01)—of hydrochlorate of pilocarpine, but this is contraindicated unless the heart is believed to be strong and acting properly. If dropsy is present, the drug will have to be given by the mouth, as it will not be absorbed from the boggy subcutaneous tissues. Pilocarpine will also tend to increase the activity of the kidneys, and in addition to this influence on the renal structure we may use caffeine in the dose of 2 grains (0.1) every four hours for three doses, to stimulate the renal epithelium still remaining healthy to greater effort.

For the support of the heart and respiratory function we employ strychnine hypodermically or by the mouth in the dose of $\frac{1}{20}$ to $\frac{1}{10}$ grain (0.003–0.006), and follow it by the more powerful stimulant digitalis in the form of the tincture in the dose of 20 drops (1.3).

The convulsions, if present or threatened, are to be combated by the use of an enema of 20 grains of chloral (1.3) and 60 grains (4.0) of bromide of sodium in 3 ounces (96.0) of starch-water, and the hot pack will also be of value, not only to produce sweating, but for its sedative influence on the venous system. Should the convulsive tendencies be marked, chloroform inhalations may be employed until the chloral or bromide can be absorbed. According to Peabody and Kinnicutt, urethan is extraordinarily efficacious in uræmic convulsions, and they advise that the dose be very large, as much as 6 to 7 drachms (24.0–28.0) in twenty-four hours. It is said to lack the irritating properties of chloral, and to be lacking in dangerous effects on the heart. The drug may be given hypodermically or by the rectum, dissolved in water.

Two other remedial measures should be resorted to in cases of uræmia for the relief of all the symptoms—namely, full venesection if the pulse is bounding, and hypodermoclysis. (See Part III.) Venesection is contraindicated in the feeble. As much as 1 to 2 pints ($\frac{1}{2}$ to 1 litre) may be withdrawn in a sthenic case from a vein in the arm. After the bloodletting or during its progress hypodermoclysis may be performed or a saline solution transfused into the vein. (See Transfusion.) Often deep insensibility is speedily removed by venesection, which should be regarded as the sheet-anchor of treatment in those cases with a high blood-pressure.

The author regards hypodermoclysis or intravenous transfusion of salt-solution as being a most useful method of treatment.

VITREOUS DISEASES.

Vitreous opacities may be either dust-like, flaky, or dense and membranous. They impair vision in proportion to their number and density, and are to be detected with the ophthalmoscope. Patients detect them as floating dark spots in their field of vision, because the opacities cast a shadow upon the retina. If vitreous disease is syphilitic, the usual remedies are indicated. Hypodermic injections of pilocarpine act favorably, and in the earlier stages of the inflammations of the retina, choroid, iris, and ciliary body, upon which the opacities depend, leeches should be applied to the temple. Galvanism has been recommended.

VOMITING.

Vomiting is of course a symptom, not a disease, and arises from a large number of causes, some of which are very unimportant, others very serious. The most common cause is probably lack of proper digestion, with all that this implies; that is, gastro-intestinal irritation and perversion of normal function. Additional causes are cerebral hemorrhage, tubercular meningitis, cerebritis, uræmia, or diseases of the middle lobe of the cerebellum, all of which conditions cause irritation of the vomiting centre.[1]

All these states may be considered as lesions of a centric character which directly or indirectly cause the vomiting centre to send out impulses. On the other hand, it is worthy of note that under certain circumstances vomiting may be reflex and dependent upon irritation of the nerves of the stomach or elsewhere which convey impulses to the muscles whose activity results in vomiting. These conditions are well represented by the vomiting which comes on in incarcerated hernia, or in pregnancy, or in that occurring during the passage of renal or hepatic calculi, or in indigestion.

It is important to bear in mind that peripheral vomiting due to disorder of the gastric walls may be dependent upon two conditions. The mucous membrane and its nerves may be over-excitable or they may be depressed. For this reason we shall find that two modes of treatment are necessary when this subject is considered below.

The mechanism of vomiting consists in the closure of the pyloric sphincter, the contraction of the gastric muscles from the pylorus to the cardia, and at the same time, and more important than these movements, the contraction of the supplementary respiratory and abdominal muscles, which so compress the stomach as to drive out its contents through the open œsophagus. The violence of the muscular contractions in the abdominal walls is greatest when the stomach is partly empty, and gives rise to the pain and exhaustion accompanying the condition known as retching. The practical point to be learned from this is that vomiting is always easier when the stomach is full; so if an emetic is given on an empty stomach, as the popular expression runs, a large amount of liquid should precede or accompany it if possible. Dogs vomit easily because of the development of the gastric muscles, but they render the effort easier by filling the stomach with air, and so completely fill the viscus that its walls can contract on a resisting mass.

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[1] See *Practical Diagnosis*, by the author. Lea Brothers & Co., Philadelphia.

Having described the mode and causes of vomiting, it still remains for us to consider its treatment.

It is needless to remark that the vomiting of cerebral disease is very intractable, and that very active agents must be used to stop it. Probably the vomiting following etherization is centric, and should be treated, as should all forms of obstinate emesis, by the injection into the rectum of 40 grains (2.65) of sodium or potassium bromide and 20 drops of laudanum in 4 to 8 ounces (128.0–256.0) of water. If this does not stop the vomiting, a second injection may be given one hour after the first. A very valuable remedy in this state is acetanilid given in 1 grain (0.05) doses every half hour in a drachm of brandy with cracked ice (See Acetanilid.)

When vomiting seems to be due to hyperexcitability of the gastric mucous membrane, so that very small amounts of food when swallowed are at once rejected, local anæsthetics and depressants are needed, the chief of these being cocaine and aconite. Both of these drugs, however, have disadvantages, because in effective dose their general physiological action may be very severe and almost poison the patient. When given to act as antiemetics, these drugs do so by acting as local anæsthetics, or, in other words, by paralyzing the peripheral sensory nerves. Cocaine should be given in the dose of 2 to 3 drops (0.1–0.15) of a 4 per cent. watery solution every fifteen minutes until 10 drops (0.65) are taken. The aconite should be used in the form of the tincture, the patient being placed flat on the back, so as to withstand the ensuing cardiac depression with the least inconvenience, and 2 to 5 drops (0.1–0.3) of the tincture given in a little water every thirty minutes until the rapidly weakening pulse forbids its further use. This drug may be resorted to in all forms of vomiting due to irritability of the stomach, but it is contraindicated in cases of debility or weakness. Aconite is generally to be preferred to cocaine.

Sometimes a prescription of the following character is of service, the bismuth acting as a coating to the walls of the stomach, protecting and soothing them:

℞.—Bismuthi subnitrat. . . . . ʒiij (12.0).
Tr. aconiti . . . . ♏ xx vel xxx (1.3–2.0).—M.
Ft. chart. No. x.
S.—One powder every half-hour.

In other cases of the same type the following is useful, and is to be preferred if, owing to active fermentation, the vomiting is excessive (the creosote or carbolic acid being a local anæsthetic and antiseptic):

℞.—Acid. carbolic. vel creosoti (beechwood) . gtt. x vel xx (0.65–1.3).
Bismuthi subnitratis . . . . ʒiij (12.0).—M.
Ft. in chart. No. x.
S.—One powder every hour.

In other cases 1 drop of tincture of iodine and 1 drop of carbolic acid in a couple of drachms of water will act very well.

Sometimes pure chloroform in 1- or 2-drop (0.05–0.1) doses, in a little water, does good; and dilute hydrocyanic acid, in the dose of 2 to 6 drops (0.1–0.4) is also of value in like instances, given in a tablespoonful (16.0) of water.

In other instances small repeated doses of nitroglycerin do good unless the vomiting complicates peritonitis or pregnancy. Particularly is nitroglycerin useful in the nausea which often follows the use of opium, although this symptom is best prevented by its use. The dose used should be about $\frac{1}{300}$ grain (0.0002).

The treatment of a case of vomiting dependent rather upon depression and debility of the stomach than upon irritation is directed to the administration of gastric and, it may be, systemic stimulants. The chief of the gastric stimulants is ipecac in small doses, and it it is this employment of a drug generally resorted to for the production of emesis by physicians which has caused homœopaths to claim that the regular school obey the law of *similia similibus curantur* and infinitesimal doses. The claim only holds good on its face, for we do not use an infinitesimal dose, and obey no law, but use common sense. Ipecac is an irritant, even to the skin, and it is partly by its irritant effects that it causes vomiting by exciting the stomach to a point over and above its normal condition. In the vomiting depending upon gastric debility and depression small doses of ipecac do good, because they irritate the stomach sufficiently to restore its normal tone without going to the other extreme of hyperexcitation. Under these circumstances a drop dose of the wine of ipecac, or $\frac{1}{4}$ of a grain (0.016) of the powdered ipecac, every hour, is of the greatest value, often succeeding after all other remedies have failed.

In other instances tincture of nux vomica, given in $\frac{1}{2}$- to 1-drop (0.025–0.05) doses, is useful as follows:

℞. –Tinct. nucis vomicæ . . . . gtt. iv vel viij (0.25–0.5).
Aquæ cinnamomi . . . . f℥j (32.0).—M.
S.—Teaspoonful (4.0) every half-hour or hour.

In the nausea and vomiting following an alcoholic debauch $\frac{1}{2}$ to 1 drop (0.025–0.05) of Fowler's solution every two hours, or before food, often gives relief, and it may be used in some cases in place of the nux vomica and ipecac. Another useful measure for the cure of alcoholic nausea is the use of full doses of hydrochloric acid, 5, 10, or 15 drops (0.3–0.65–1.0) of the dilute acid in half a tumblerful of water, repeated every two hours.

In all cases of persistent vomiting counter-irritation should be applied over the stomach in the form of a mustard plaster, or, if preferred, an ice-bag may be applied to the nape of the neck, the lumbar spine, or the epigastrium. Sometimes the application of the positive pole of the rapidly interrupted induced or faradic current applied between the sterno-clavicular muscles while the negative is placed on the epigastrium will give relief.

The food given in cases of vomiting should be especially prepared. It is always best to use peptonized milk, made by using the peptonizing materials sold by all the large drug firms of reliability. (See article on Diet, Part III.) Lime-water should always be put in the milk if it is not peptonized; the amount usually employed is perfectly useless, because of its smallness: at least 2 to 3 tablespoonfuls (32.0–48.0) should be placed in each glass of milk.

Another point of importance is the quantity of liquid taken. As fast as the patient vomits he is often fed with glasses full of liquid by well-meaning friends. Instead of this, he should have only 1 or 2 teaspoonfuls (4.0–8.0) of milk every hour, half-hour, or fifteen minutes, for it is better for him to retain a drachm than to take a quart and vomit it.

Where vomiting is absolutely persistent enemata previously partly or entirely digested must be resorted to.

WHOOPING COUGH.

The remedies recommended for this disease are almost as numerous as the members of the medical profession, and every one of them is worthless so far as a cure is concerned. Probably the very best drug of all in the majority of cases is antipyrin. Given in the dose of ½ to 3 grains (0.025–0.15) every five hours according to the age of the child, it will nearly always decrease the number of paroxysms, but not the severity of each individual attack.

Where the child will submit to it there is little doubt that a solution of quinine applied to the pharynx by means of a very fine spray will be of service in many cases, and it is very useful, when so used, as a prophylactic in other children of the family who it is feared will be attacked by the same disease. The strength of the solution to be employed should be about 1 grain (0.05) to the ounce of water.

There is no doubt that carburetted hydrogen as inhaled in the air at gasworks is useful as a curative measure in some cases of whooping cough.

A very useful remedy in some cases is belladonna in the form of the tincture, in the dose of 2 drops (0.01) twice a day to a child of one or two years. Where great vascular engorgement ensues upon a severe coughing spell vascular sedatives are of service; that is, in those cases in which hemorrhages from the nose, ears, and mouth take place veratrum viride or aconite may be used, unless the disease has already so exhausted the child that stimulants are needed, and cardiac sedatives are contraindicated by the degree of adynamia present. The reason for this lies in the following facts: The vascular tension consequent upon the obstruction of respiration causes a rise of blood-pressure from asphyxia, and the hemorrhages or the conjunctival ecchymoses are due to rupture of the small blood-vessels under the increased strain. By lowering vascular tension we prevent so great a spasm of the blood-vessels and avoid vascular rupture or distention.

Where paroxysms come on so rapidly as really to interfere seriously with respiration, the child should take a whiff of chloroform poured over the parent's hand, and so relax the spasm, while in other instances nitrite of amyl is equally serviceable. Only 2 to 3 drops of the nitrite of amyl should be used at a time, and this fact must be impressed upon the parents.

Benzine has been found useful in certain cases of whooping cough. It should be lightly sprinkled about the room or on the bed-clothing. In France it has been used internally in the dose of 10 to 15 drops (0.6–1.0) for this affection. This is scarcely to be recommended.

Bromoform renders good service in some cases. (See article on Bromoform for prescription.)

The vomiting following the cough may be overcome by using such minute amounts of milk as to enable nutrition to go on without at any time overloading the stomach, as, for example, a teaspoonful (4.0) after each paroxysm of cough.

Often it will be found possible to modify the severity and frequency of the attacks by keeping the patient under a bronchitis tent or by keeping the air of the room moistened by steam. (See Bronchitis.)

WORMS.

Intestinal parasites may be said to be represented by the Ascaris lumbricoides, or *round-worm;* the Tænia solium, Tænia media canellata, and the Bothriocephalus latus, or *tape-worms;* and, finally, by the Oxyuris vermicularis, sometimes called *seat-*, *pin-*, or *thread-worm.*

The round-worm and tape-worm are to be attacked by way of the patient's mouth, the seat-worm by way of the anal opening; but before mentioning the drugs to be employed it is necessary to insist upon one or two important points, disregard of which will result in failure in treatment.

Whenever a round- or tape-worm is to be attacked, the patient must be starved for at least twelve to twenty-four hours, in order that no food in the intestinal tract may protect the worm from the action of the drug. During this time a little milk may be taken, and after a night of fasting, before breakfast, the anthelmintic must be swallowed. Further than this, nearly all of these drugs must be followed by purges in order to dislodge the intruder while he is paralyzed and has lost his hold; and in many instances it is well to have a basin of salt and water ready, so that when a passage occurs a rectal injection may be given to wash out any segments of the worm which remain behind in the rectum.

In the treatment of thread-worms it is necessary to fill the bowel thoroughly with soap and water to dislodge the fæcal matter and expose the worms in the folds of the mucous membrane

The drugs which are used against the round-worm are: Spigelia in the form of the fluid extract, dose 1 drachm (4.0) to a child of two or three years, or 2 drachms (8.0) to an adult, or, better still, the fluid extract of spigelia and senna, dose 2 to 3 drachms (8.0–12.0), given in divided doses, to a child; oil of chenopodium, dose 5 to 20 drops (0.3–1.3) on sugar; santonin, dose ¼ to ½ grain (0.016–0.025) to a child, in the form of troche, *made by using the crystals*, or as much as 2 to 4 grains (0.1–0.2) to an adult. (See Santonin.)

Brayera, or kooso, is given for the removal of the tape-worm in the form of an infusion, which is made by adding ½ ounce (16.0) of the powdered leaves to 1 pint (500 cc.) of water and mucilage of acacia, one-half of each. This may be taken at one dose, or the fluid extract may be given in the dose of ½ ounce (16.0) to an adult. Koosin may be given in 40-grain (2.65) doses in capsule to adults, but it should not be used against worms in pregnant women, as it may cause abortion.

Unless the spigelia is used with senna, it should always be followed after from two to four hours by a full dose of castor oil or a saline purgative to sweep out the worm, and the same rule applies to all the drugs mentioned above.

The most efficient remedy against the tape-worm is pelletierine, the active principle of pomegranate, dose 3 to 5 grains (0.18–0.26) in capsules; or pepo, or pumpkin-seeds (2 ounces [64.0]), may be resorted to when deprived of their outer coating and rubbed into a paste with sugar. Almost, if not quite, as valuable a remedy is male fern, or *Filix mas*, or, as it is officially called, *Aspidium*. Used in the form of the oleoresin (*Oleoresina Aspidii*), in the dose of ½ to 1 drachm (2.0–4.0) to an adult, it should be followed in three or four hours by a calomel purge, aided by a saline. Either the calomel or the increased amount of bile which is present is apparently peculiarly abhorrent to the tape-worm, and its free excretion should follow the use of all the drugs just named. Aspidium should not be followed by castor or other oils, as they increase the absorbability of the drug, and so tend to develop poisonous symptoms.

By far the most useful remedy for seat-worms is quassia used by injection. 1 to 2 ounces (32.0–64.0) of powdered quassia or quassia chips may be made into a decoction with a pint (500 cc.) of water, and half of this injected into the rectum after it has been well cleansed with soap and water. The quassia injection should be retained in the bowel for some minutes, and in children this may be accomplished by pressing upon the anal opening the ball of the thumb covered by a pad formed from a small folded towel. If this treatment fails to bring away all the worms in three or four trials, either there are none present or the bowel is not thoroughly invaded by the injection. In some cases the worms infest the colon, and large injections sent high up into the bowel are necessary.

DOSES OF MEDICINES.

dr. = drachm ; *fl. dr.* = fluidrachm ; *fl. oz.* = fluidounce ; *gr.* = grain ; *gm.* = gramme ; *min.* = minim ; *oz.* = ounce.

REMEDY.	DOSE.	
	Apothecaries' Weights and Measures.	Metric System.
Acetanilid	1–8 gr.	0.06–0.5 gm.
Acetophenone	5–20 min.	0.3-1.25 gm.
Acetphenetidin	2–5 gr.	0.12–0.3 gm.
Acetum lobeliæ	15–30 min.	1.0-2.0 gm.
opii	5–10 min.	0.3–0.6 gm.
sanguinariæ	15–30 min.	1.0-2.0 gm.
scillæ	10–30 min.	0.6-1.8 gm.
Acid, acetic, diluted	1–2 fl. dr.	4.0–8.0 gm.
arsenous	$\frac{1}{60}$–$\frac{1}{20}$ gr.	0.001–0.003 gm.
solution of (Ph. U. S.)	2–8 min.	0.12–0.5 gm.
benzoic	5–15 gr.	0.3–1.0 gm.
boric	5–10 gr.	0.3–0.6 gm.
carbolic	$\frac{1}{2}$–1 gr.	0.03-0.06 gm.
chrysophanic	$\frac{1}{8}$–5 min.	0.008-0.3 gm.
citric	5–20 gr.	0.3–1.25 gm.
fluoric, dilute	10–20 min.	0.6–1.2 gm.
gallic	3–15 gr.	0.2–1.0 gm.
hydriodic, dilute	$\frac{1}{2}$ fl. dr.	2.0 gm.
hydrobromic, dilute	$\frac{1}{2}$–2 fl. dr.	2.0-8.0 gm.
hydrochloric	2–5 min.	0.12–0.3 gm.
dilute	10–20 min.	0.6–1.2 gm.
hydrocyanic, dilute	2–5 min.	0.12–0.3 gm.
lactic	1–3 dr.	4.0-12.0 gm.
nitric	2–5 min.	0.12–0.3 gm.
dilute	10-25 min.	0.6-1.5 gm.
nitrohydrochloric	2–5 min.	0.12–0.3 gm.
phosphoric, dilute	5–25 min.	0.3–1.5 gm.
picric	1–5 gr.	0.06–0.3 gm.
polygalic	$\frac{1}{4}$–1 gr.	0.015–0.06 gm.
salicylic	5–15 gr.	0.3–1 gm.
sulphuric	2–5 min.	0.12–0.3 gm.
aromatic	5–20 min.	0.3–1.2 gm.
dilute	5–20 min.	0.3–1.2 gm.
sulphurous	$\frac{1}{2}$–1 fl. dr.	2–4 gm.
tannic	2–10 gr.	0.12-0.6 gm.
tartaric	10–30 gr.	0.6–2 gm.
valerianic	3–4 min.	0.2–0.25 gm.
Aconite, abstract of	$\frac{1}{4}$–$\frac{1}{2}$ gr.	0.015–0.03 gm.
leaves, extract of	$\frac{1}{4}$–$\frac{1}{2}$ gr.	0.015–0.03 gm.
fluid extract of	1–5 min.	0.06–0.3 gm.
tincture of	10–15 min.	0.6–1.0 gm.
root, extract of	$\frac{1}{6}$–$\frac{1}{4}$ gr.	0.01–0.016 gm.
fluid extract of	$\frac{1}{2}$–1 min.	0.03-0.06 gm.
tincture of	1–3 min.	0.06–0.18 gm.
Aconitine	$\frac{1}{400}$–$\frac{1}{300}$ gr.	0.00015–0.0002 gm.
Adonidin	$\frac{1}{12}$–$\frac{1}{6}$ gr.	0.005–0.01 gm.
Æther. See *Ether.*		

Remedy.	Dose.	
	Apothecaries' Weights and Measures.	Metric System.
Agaricin	1/12–¼ gr.	0.005–0.015 gm.
Aloes	2–6 gr.	0.1–0.35 gm.
extract of	2–6 gr.	0.1–0.35 gm.
and myrrh, tincture of	1–2 fl. dr.	4.0–8.0 gm.
tincture of	1–2 fl. dr.	4.0–8.0 gm.
watery extract	½–2 gr.	0.03–0.12 gm.
wine of	1–2 fl. dr.	4.0–8.0 gm.
Aloin	1–3 gr.	0.06–0.18 gm.
Alumen	5–10 gr.	0.3–0.6 gm.
(as emetic)	30 gr.–1 dr.	2.0–4.0 gm.
Aluminium hydrate	5–15 gr.	0.3–1.0 gm.
Ammonia, aromatic spirit	30 min.–1 fl. dr.	2–4 gm.
solution of acetate of	1–2 fl. dr.	4–8 gm.
spirit of	5–15 min.	0.6–1.0 gm.
water of	2–6 gr.	0.1–0.35 gm.
Ammoniacum	10–30 gr.	0.6–2 gm.
mixture	½–1 oz.	16–32 gm.
Ammonium benzoate	10–20 gr.	0.6–1.2 gm.
bromide	10–30 gr.	0.6–2 gm.
carbonate	3–10 gr.	0.18–0.6 gm.
chloride	5–10 gr.	0.3–0.6 gm.
iodide	3–5 gr.	0.18–0.3 gm.
phosphate	10–20 gr.	0.6–1.2 gm.
picrate	¼–½ gr.	0.016–0.03 gm.
sulphate	3–10 gr.	0.18–0.6 gm.
valerianate	2–8 gr.	0.12–0.48 gm.
Amygdala amara, water of	1–2 fl. dr.	4.0–8.0 gm.
Amyl nitrite	2–3 min.	0.12–0.18 gm.
by inhalation	3–5 min.	0.18–0.3 gm.
Amylene hydrate	10–30 min.	0.6–2.0 gm.
Amylum iodatum	5–30 gr.	0.3–2.0 gm.
Angelica-root, fluid extract	30–60 min.	2.0–4.0 gm.
Angustura-bark	10–30 gr.	0.6–2.0 gm.
Anise, oil of	1–5 min.	0.06–0.3 gm.
spirit of	1–2 fl. dr.	4.0–8.0 gm.
Anthemis	½–1 dr.	2–4 gm.
extract	2–10 gr.	0.12–0.6 gm.
fluid extract	30–60 min.	2.0–4.0 gm.
Antimonial powder	1–3 gr.	0.06–0.18 gm.
Antimony oxide	2–3 gr.	0.12–0.18 gm.
oxysulphuret	½–2 gr.	0.03–0.12 gm.
and potassium tartrate, as diaphoretic	1/16–½ gr.	0.004–0.03 gm.
as emetic	½–1 gr.	0.03–0.06 gm.
sulphide	½–2 gr.	0.03–0.12 gm.
sulphurated	1–2 gr.	0.06–0.12 gm.
sulphuret	½–2 gr.	0.03–0.12 gm.
wine of	10 min.–1 fl. dr.	0.6–4 gm.
Antipyrine	5–15 gr.	0.3–1.0 gm.
Antitoxine (for diphtheria)	5–10 cc.	
Apiol	2–5 gr.	0.12–0.3 gm.
Apocynin	½–2 gr.	0.03–0.12 gm.
Apocynum cannabinum	10–20 gr.	0.6–1.2 gm.
fluid extract of	10–30 min.	0.6–2.0 gm.
Apomorphine hydrochlorate	1/15–1/10 gr.	0.004–0.006 gm.
Aralia hispida, fluid extract of	30–60 min.	2.0–4.0 gm.
nudicaulis, fluid extract of	30–60 min.	2.0–4.0 gm.
racemosa, fluid extract of	30–60 min.	2.0–4.0 gm.
spinosa, fluid extract of	30–60 min.	2.0–4.0 gm.
Arbutin	1–10 gr.	0.06–0.6 gm.
Areca, fluid extract of	30–60 min.	2.0–4.0 gm.
Argentum and compounds. See *Silver*.		
Arnica-flowers, extract of	2–5 gr.	0.12–0.3 gm.

REMEDY.	DOSE.	
	Apothecaries' Weights and Measures.	Metric System.
Arnica-flowers, fluid extract of	5–15 gr.	0.3–1.0 gm.
root, extract of	2–5 gr.	0.12–0.3 gm.
fluid extract of	5–15 gr.	0.3–1.0 gm.
tincture of	10–20 gr.	0.6–1.2 mg.
Aromatic powder	10–30 gr.	0.6–2.0 gm.
Arsenate of sodium, solution of	3–5 min.	0.18-0.3 gm.
Arsenic. See *Acid, arsenous.*		
bromide	1–4 min.	0.06–0.024 gm.
iodide	$\frac{1}{16}$–$\frac{1}{8}$ gr.	0.004-0.008 gm.
and mercury iodide, solution of (Donovan's solution)	5–10 min.	0.3–0.6 gm.
Arsenite of potassium, solution of (Fowler's solution)	2–5 min.	0.12–0.3 gm.
Asafœtida	5–20 gr.	0.3–1.2 gm.
mixture of	$\frac{1}{2}$–1 fl. oz.	15-30 gm.
tincture	30 min.–1 fl. dr.	2–4 gm.
Asclepias incarnata, fluid extract of	15–30 min.	1.0–2.0 gm.
Syriaca, fluid extract of	15–30 min.	1.0–2.0 gm.
tuberosa	15–30 min.	1.0–2.0 gm.
Aspidium, fluid extract of	1–2 fl. dr.	4.0–8.0 gm.
oleo-resin of	30 min.–1 fl. dr.	2.0–4.0 gm.
Aspidosperma, abstract of	5–20 gr.	0.3–1.2 gm.
fluid extract of	15-30 min.	1.0–2.0 gm.
Atropine sulphate	$\frac{1}{120}$–$\frac{1}{40}$ gr.	0.0005–0.0015 gm.
Aurantii cortex, fluid extract of	15 min.–2 fl. dr.	1.0–8.0 gm.
Azedarach, fluid extract of	15–60 min.	1.0–4.0 gm.
Balsam of Gurjun	20–30 min.	1.2–2.0 gm.
of Tolu	10–30 min.	0.6–2.0 gm.
Baptisia, extract of	2–10 gr.	0.12–0.6 gm.
fluid extract of	10-30 min.	0.6–2.0 gm.
Baptisine	2–5 gr.	0.12–0.3 gm.
Belladonna, abstract of	$\frac{1}{2}$–1$\frac{1}{2}$ gr.	0.03–0.1 gm.
alcoholic extract of	$\frac{1}{4}$–$\frac{1}{2}$ gr.	0.016–0.03 gm.
leaves, fluid extract of	3–6 min.	0.18–0.36 gm.
tincture of	10–20 min.	0.6–1.2 gm.
root, extract of	$\frac{1}{8}$–$\frac{1}{4}$ gr.	0.008–0.016 gm.
fluid extract of	1–2 min.	0.06–0.12 gm.
Benzanilide	1–5 gr.	0.06–0.3 gm.
Benzoin, compound tincture of	30 min.–1 fl. dr.	2.0–4.0 gm.
tincture of	$\frac{1}{2}$–1 fl. dr.	2 0–4.0 gm.
Benzol	5–10 min.	0.3–0.6 gm.
Berberina	3–10 gr.	0.18–0.6 gm.
sulphate	3–10 gr.	0.18-0.6 gm.
Berberis aquifolium, fluid extract of	15–30 min.	1.0-2.0 gm.
vulgaris, fluid extract of	15–30 min.	1.0–2.0 gm.
Bismuth and ammonium, citrate of	1–10 gr.	0.06–0.6 gm.
citrate	3–15 gr.	0.18–1.0 gm.
salicylate	5–15 gr.	0.3-1.0 gm.
subcarbonate	5–20 gr.	0.3–1.2 gm.
subnitrate	5–20 gr.	0.3–1.2 gm.
tannate	5–30 gr.	0.3–2.0 gm.
valerianate	1–3 gr.	0.06–0.18 gm.
Boldo, fluid extract of	5–15 min.	0.3–1.0 gm.
oil of	5 min.	0.3 gm.
tincture of	8 min.	0.5 gm.
Brayera	2–3 dr.	8.0–12.0 gm.
fluid extract of	$\frac{1}{2}$–1 fl. oz.	15.0–30.0 gm.
infusion of	4–8 oz.	118.0–236.0 gm.
Bromal	2–3 gr.	0.12–0.2 gm.
Bromoform	5–10 min.	0.3–0.6 gm.
Brucina	$\frac{1}{32}$–$\frac{1}{16}$ gr.	0.002–0.004 gm.

REMEDY.	DOSE.	
	Apothecaries' Weights and Measures.	Metric System.
Bryonia, fluid extract of	15–60 min.	1.0–4.0 gm.
tincture of	15–30 min.	1.0-2.0 gm.
Buchu, fluid extract of	½-1 fl. dr.	2.0–4.0 gm.
Buckthorn, fluid extract of	15–30 min.	1.0-2.0 gm.
Cactus grandiflora, fluid extract of	5-10 min.	0.3–0.6 gm.
Caffeine	2–5 gr.	0.12-0.3 gm.
citrate of	2–5 gr.	0.12-0.3 gm.
Cajeput, oil of	5–20 min.	0.3–1.2 gm.
Calamus, fluid extract of	15-60 min.	1.0–4.0 gm.
Calcium benzoate	10 gr.	0.6 gm.
bromide	10–20 gr.	0.6-1.2 gm.
carbonate	15-30 gr.	1.0-2.0 gm.
chloride	5-10 gr.	0.3–0.6 gm.
hypophosphite	10–30 gr.	0.6-2.0 gm.
iodide	1-3 gr.	0.06–0.18 gm.
lactophosphate, syrup of	1-2 fl. dr.	4.0–8.0 gm.
phosphate	15–30 gr.	1.0-2.0 gm.
sulphide	⅕-½ gr.	0.012–0.03 gm.
Calendula, fluid extract of	15-60 min.	1.0-4.0 gm.
tincture of	15–30 min.	1.0-2.0 gm.
Calomel. See *Mercury, mild chloride of.*		
Calumba, extract of	3–10 gr.	0.18–0.6 gm.
fluid extract of	15-60 min.	1.0–4.0 gm.
tincture of	1-4 fl. dr.	4.0–16.0 gm.
Calx chlorata	2–5 gr.	0.12–0.3 gm.
sulphurata	¼–1 gr.	0.016–0.06 gm.
Camphor	2–10 gr.	0.12-0.6 gm.
bromide	2-5 gr.	0.12–0.3 gm.
monobromated	2–5 gr.	0.12–0.3 gm.
spirit of	5-30 min.	0.3-2.0 gm.
water	½–2 fl. oz.	16.0–64.0 gm.
Camphoric acid	15-30 gr.	1.0-2.0 gm.
Cannabin tannate	5-10 gr.	0.3–0.6 gm.
Cannabis Americana, fluid extract of	3-15 min.	0.18–1.0 gm.
Indica, abstract of	1-3 gr.	0.06–0.18 gm.
extract of	¼–1 gr.	0.015–0.06 gm.
fluid extract of	3–6 min.	0.18–0 36 gm.
tincture of	5–20 min.	0.3–1.2 gm.
Cantharides	½–1 gr.	0.03–0.06 gm.
tincture of	2–5 min.	0.12–0.3 gm.
Capsicum	½-2 gr.	0.03-0.12 gm.
fluid extract of	½-1 min.	0.03–0.06 gm.
oleoresin of	¼–1 min.	0.015–0.06 gm.
tincture of	5–20 min.	0.3–1.2 gm.
Caraway, oil of	1–5 min.	0.06–0.3 gm.
Carbon bisulphide	½–1 min.	0.03-0.06 gm.
Cardamom, compound tincture of	1–2 fl. dr.	4.0–8.0 gm.
fluid extract of	15-45 min.	1.0–3.0 gm.
tincture of	1–2 fl. dr.	4.0–8.0 gm.
Caryophyllus, oil of	1–5 min.	0.06-0.3 gm.
Cascara sagrada	2–8 gr.	0.12–0.5 gm.
extract of	2–8 gr.	0.12–0.5 gm.
fluid extract of	10–30 min.	0.6–2.0 gm.
Cascarilla	20–30 gr.	1.2-2.0 gm.
fluid extract of	1-2 fl. dr.	4.0–8.0 gm.
Cassia fistula, pulp of	1–2 dr.	4.0–8.0 gm.
Castanea vesca, fluid extract of	½-1 fl. dr.	2.0–4.0 gm.
Castor	10–30 gr.	0.6–2.0 gm.
tincture of	2-4 fl. dr.	8.0–16.0 gm.
Cataria, fluid extract of	15 min.–1 fl. dr.	1.0–4.0 gm.
Catechu	10–30 gr.	0.6–2.0 gm.

REMEDY.	DOSE.	
	Apothecaries' Weights and Measures.	Metric System.
Catechu, compound tincture of	½-2 fl. dr.	2.0-8.0 gm.
fluid extract of	10-30 min.	0.6-2.0 gm.
Caulophyllin	¼-½ gr.	0.015-0.03 gm.
Caulophyllum, infusion of	1-2 oz.	16.0-64.0 gm.
Cava-cava	10-30 gr.	0.6-2.0 gm.
Cerium nitrate	1-2 gr.	0.06-0.12 gm.
oxalate	1-2 gr.	0.06-0.12 gm.
Chalk, compound powder of	10-30 gr.	0.6-2.0 gm.
mixture	1-2 fl. oz.	32-64 gm.
prepared	15-30 gr.	1.0-2.0 gm.
Chamomile, oil of	5-15 min.	0.3-1.0 gm.
Charcoal, animal, purified	10-30 gr.	0.6-2.0 gm.
Chelidonium majus	½-1 dr.	2.0-4.0 gm.
extract of	5-10 gr.	0.3-0.6 gm.
fluid extract of	15-30 min.	1.0-2.0 gm.
Chenopodium, oil of	4-8 min.	0.24-0.5 gm.
Cherry-laurel water	5-30 min.	0.3-2.0 gm.
Chimaphila, fluid extract of	1-2 fl. dr.	4.0-8.0 gm.
Chinoidin	10-30 gr.	0.6-2.0 gm.
Chionanthus, fluid extract of	30-60 min.	2.0-4.0 gm.
Chiretta, fluid extract of	½-1 fl. dr.	2.0-4.0 gm.
tincture of	15-60 min.	1.0-4.0 gm.
Chloral hydrate	5-20 gr.	0.3-1.2 gm.
Chloralamide	15-30 gr.	1.0-2.0 gm.
Chlorine-water	1-4 fl. dr.	4.0-15.0 gm.
Chloroform, mixture of	1-4 fl. dr.	4.0-15.0 gm.
purified	5-10 min.	0.3-0.6 gm.
spirit of	10 min.-1 fl. dr.	0.6-4.0 gm.
Chrysarobin	5-20 gr.	0.3-1.2 gm.
Cimicifuga, fluid extract of	10-30 min.	0.6-2.0 gm.
tincture of	½-1 fl. dr.	2.0-4.0 gm.
Cinchona-bark	10 gr.-1 dr.	0.6-4.0 gm.
aromatic fluid extract of	30-60 min.	2.0-4.0 gm.
compound tincture of	1-2 fl. dr.	4.0-8.0 gm.
extract of	10-30 gr.	0.6-2.0 mg.
fluid extract of	10-30 min.	0.6-2.0 gm.
tincture of	1-2 fl. dr.	8.0-15.0 gm.
Cinchonia sulphate	10-20 gr.	0.6-1.2 gm.
Cinchonidia or Cinchonidine sulphate	10-30 gr.	0.6-2.0 gm.
Cinchonine sulphate	10-30 gr.	0.6-2.0 gm.
Cinnamon	5-20 gr.	0.3-1.2 gm.
oil of	1-5 min.	0.06-0.3 gm.
spirit of	5-20 min.	0.3-1.2 gm.
tincture of	½-2 fl. dr.	2.0-8.0 gm.
Cloves. See *Caryophyllus.*		
Coca, fluid extract of	20 min.-1 fl. dr.	1.2-4.0 gm.
leaves of	½-1 dr.	2.0-4.0 gm.
Cocaine	½-1 gr.	0.03-0.06 gm.
Cocculus, fluid extract of	1-3 min.	0.06-0.2 gm.
tincture of	2-10 min.	0.12-0.6 gm.
Codeine or Codeia	1-2 gr.	0.06-0.12 gm.
Colchicine	1/100-1/50 gr.	0.0012-0.0006 gm.
Colchicum, acetic extract of	¼-½ gr.	0.015-0.03 gm.
root	2-5 gr.	0.12-0.3 gm.
extract of	¼-½ gr.	0.015-0.03 gm.
fluid extract of	2-5 min.	0.12-0.3 gm.
wine of	10-20 min.	0.6-1.2 gm.
seed	2-10 gr.	0.12-0.6 gm.
fluid extract of	2-8 min.	0.12-0.5 gm.
tincture of	10-30 min.	0.6-2.0 gm.
wine of	20-40 min.	1.2-2.4 gm.

Remedy.	Dose.	
	Apothecaries' Weights and Measures.	Metric System.
Colocynth	2–8 gr.	0.12–0.5 gm.
compound extract of	5–10 gr.	0.3–0.6 gm.
extract of	2–5 gr.	0.12–0.3 gm.
Colocynthidine	1/12–1/6 gr.	0.005–0.01 gm.
Colocynthin	1/4–1 gr.	0.015–0.06 gm.
Condurango, fluid extract of	10–30 min.	0.6–2.0 gm.
Coniine	1/64–1/32 gr.	0.001–0.002 gm.
hydrochlorate	1/64–1/32 gr.	0.001–0.002 gm.
Conium, abstract of	1–2 gr.	0.06–0.12 gm.
fluid extract of	5 min.	0.3 gm.
fruit, alcoholic extract of	1/2–1 gr.	0.03–0.06 gm.
fluid extract of	1–2 min.	0.06–0.12 gm.
tincture of	10–20 min.	0.6–1.2 gm.
leaves, extract of	1–2 gr.	0.06–0.12 gm.
fluid extract of	1–3 min.	0.06–0.18 gm.
Convallamarin	1/2–2 gr.	0.03–0.12 gm.
Convallaria, extract of	2–10 min.	0.12–0.6 gm.
fluid extract of	15–30 min.	1.0–2.0 gm.
Copaiba	20 min.-1 fl. dr.	1.2–4.0 gm.
oil of	10–20 min.	0.6–1.2 gm.
oleo-resin of	2–10 gr.	0.12–0.6 gm.
Copper, acetate	1/4–1/2 gr.	0.015-0.03 gm.
ammoniated	1/6–1 gr.	0.01–0.06 gm.
sulphate, astringent, tonic	1/4–1/2 gr.	0.015–0.03 gm.
emetic	5 gr.	0.3 gm.
Coptis, fluid extract of	30–60 min.	2.0–4.0 gm.
Corrosive sublimate. See *Mercury.*		
Corydalis, fluid extract of	15–30 min.	1.0–2.0 gm.
Coto	1–2 gr.	0.06–0.12 gm.
fluid extract of	5–15 min.	0.3–1.0 gm.
tincture of	2–10 min.	0.12–0.6 gm.
Cotoïn	1/12–1/8 gr.	0.005–0.008 gm.
Cotton-root bark. See *Gossypium.*		
Creasote	1–3 min.	0.06–0.18 gm.
water	1-4 fl. dr.	4.0–15.0 gm.
Creolin	1/2 gr.	0.03 gm.
Croton-chloral hydrate	2–10 gr.	0.12–0.6 gm.
Croton oil	1/2–1 min.	0.03–0.06 gm.
Cubebs	10 gr.–1 dr.	0.6–4.0 gm.
fluid extract of	15–30 min.	1.0–2.0 gm.
oil of	10–20 min.	0.6–1.2 gm.
oleoresin of	5–20 gr.	0.3–1.2 gm.
tincture of	1–2 fl. dr.	4.0–8.0 gm.
Curare	1/32–1/8 gr.	0.002–0.008 gm.
Curarin	1/64–1/32 gr.	0.001-0.002 gm.
Cypripedium	15 gr.	1.0 gm.
fluid extract of	15–30 min.	1.0–2.0 gm.
Damiana, fluid extract of	30 min.–2 fl. dr.	2.0–8.0 gm.
tincture	1–3 fl. dr.	4.0–12.0 gm.
Daturine	1/100–1/50 gr.	0.0006–0.0012 gm.
Delphinium, fluid extract of	1–3 min.	0.06–0.2 gm.
Digitaline	1/60–1/30 gr.	0.001–0.002 gm.
Digitalis, abstract of	1–2 gr.	0.06 0.12 gm.
extract of	1/6–1/2 gr.	0.01-0.03 gm.
fluid extract of	1–6 min.	0.06–0.35 gm.
infusion of	2–4 fl. dr.	8.00–16.00 gm.
powder of leaves of	1/2–1 gr.	0.03–0.06 gm.
tincture of	5–15 min.	0.3–1.0 gm.
Dioscorea, fluid extract of	15-30 min.	1.0–2.0 gm.
Dita, fluid extract of	1–4 min.	0.06–0.25 gm.
Dogwood, bark of root	20–60 gr.	1.2–4.0 gm.

REMEDY.	DOSE.	
	Apothecaries' Weights and Measures.	Metric System.
Dogwood, fluid extract of	30-60 min.	2.0–4.0 gm.
Donovan's solution. See *Arsenic.*		
Dover's powder	5–10 gr.	0.3–0.6 gm.
Dracontium	10–20 gr.	0.6-1.2 gm.
fluid extract of	$\frac{1}{2}$–1 fl. dr.	2.0-4.0 gm.
Drosera, fluid extract of	5–10 min.	0.3–0.6 gm.
Duboisine	$\frac{1}{100}$ gr.	0.0006 gm.
Dulcamara, extract of	5-10 gr.	0.3–0.6 gm.
fluid extract of	$\frac{1}{2}$–1 fl. dr.	2.0–4.0 gm.
Elaterin	$\frac{1}{60}$–$\frac{1}{20}$ gr.	0.001–0.003 gm.
Elaterium	$\frac{1}{10}$–$\frac{1}{4}$ gr.	0.006–0.015 gm.
Emetin, diaphoretic	$\frac{1}{120}$–$\frac{1}{30}$ gr.	0.0005-0.002 gm.
emetic	$\frac{1}{8}$–$\frac{1}{4}$ gr.	0.008–0.015 gm.
Ergot	15–60 gr.	.0–4.0 gm.
extract of	2–10 gr.	0.12–0.06 gm.
fluid extract of	15 min.-1 fl. dr.	1.0-4.0 gm.
tincture of	$\frac{1}{2}$–2 fl. dr.	2.0–8.0 gm.
wine of	1–3 fl. dr.	4.0–12.0 gm.
Ergotin, Bonjean's (purified extract of ergot)	2–8 gr.	0.12–0.5 gm.
Erigeron, oil of	5-15 min.	0.3–1.0 gm.
Eriodictyon, extract of	2–5 gr.	0.12–0.3 gm.
fluid extract of	15–30 min.	1.0–2.0 gm.
Erythrophlœin	$\frac{1}{16}$–$\frac{1}{8}$ gr.	0.004–0.008 gm.
Erythroxylon. See *Coca.*		
Eserine	$\frac{1}{60}$–$\frac{1}{20}$ gr.	0.001–0.003 gm.
Ether, acetic	10–20 min.	0.6–1.2 gm.
compound spirit of (Hoffman's anodyne)	30 min.	2.0 gm.
nitrous, spirit of (sweet spirit of nitre)	$\frac{1}{2}$–1 fl. dr.	2.0–4.0 gm.
sulphuric	15-40 min.	1.0–2.5 gm.
Ethyl bromide	15-60 min.	1.0–4.0 gm.
Eucalyptol	10–15 min.	0.6–1.0 gm.
Eucalyptus, fluid extract of	15–30 min.	1.0-2.0 gm.
oil of	5–10 min.	0.3–0.6 gm.
Euonymin	2–5 gr.	0.12–0.3 gm.
Euonymus, extract of	1–3 gr.	0.06–0.18 gm.
fluid extract of	$\frac{1}{2}$–1 fl. dr.	2.0–4.0 gm.
Eupatorium, fluid extract of	$\frac{1}{2}$–1 fl. dr.	2.0–4.0 gm.
Euphorbia pilulifera, fluid extract of	5–30 min.	0.3–2.0 gm.
Fel bovis purificatum	3–6 gr.	0.18–0.36 gm.
Ferrum. See *Iron.*		
Frangula, fluid extract of	1–2 fl. dr.	4.0-8.0 gm.
Galls, aromatic syrup of	1-2 fl. dr.	4.0-8.0 gm.
fluid extract of	1–2 fl. dr.	4.0-8.0 gm.
tincture of	$\frac{1}{2}$–2 fl. dr.	2.0–8.0 gm.
Gamboge	$\frac{1}{2}$–4 gr.	0.03–0.25 gm.
Gaultheria, oil of	2–10 min.	0.12–0.6 gm.
Gelsemium, abstract of	1–2 gr.	0.06-0.12 gm.
extract of	$\frac{1}{2}$–1 gr.	0.03-0.06 gm.
fluid extract of	2–5 min.	0.12–0.3 gm.
tincture of	5–10 min.	0.3–0.6 gm.
Gentian, compound infusion of	1–4 fl. dr.	4.0–8.0 gm.
extract of	2–3 gr.	0.12–0.2 gm.
fluid extract of	$\frac{1}{2}$–1 fl. dr.	2.0–4.0 gm.
tincture of	1–2 fl. dr.	4.0–8.0 gm.
Geranium, fluid extract of	20-30 min.	1.2–2.0 gm.
Ginger, fluid extract of	10–30 min.	0.6–2.0 gm.
oleo-resin of	1–3 gr.	0.06–0.18 gm.
tincture of	15–30 min.	1.0–2.0 gm.
Glycyrrhiza. See *Licorice.*		
Goa powder	5–20 gr.	0.3–1.2 gm.
Gold bromide	$\frac{1}{8}$–$\frac{1}{2}$ gr.	0.008–0.03 gm.

Remedy.	Dose.	
	Apothecaries' Weights and Measures.	Metric System.
Gold and sodium chloride	1/40–1/20 gr.	0.001–0.003 gm.
Gossypium-root, fluid extract of bark of	½–1 fl. dr.	2.0–4.0 gm.
Granati radicis cortex, fluid extract	1–2 fl. dr.	4.0–8.0 gm.
Grindelia, fluid extract of	½–1 fl. dr.	2.0–4.0 gm.
Guaiac, ammoniated tincture of	30–60 min.	2.0–4.0 gm.
resin of	10–20 gr.	0.6–1.2 gm.
tincture of	30–60 min.	2.0–4.0 gm.
Guaiacol	½–3 gr.	0.03–0.18 gm.
Guarana	10–30 gr.	0.6–2.0 gm.
fluid extract of	10–30 min.	0.6–2.0 gm.
Gurjun. See *Balsam.*		
Hæmatoxylon	10–20 gr.	0.6–1.2 gm.
extract of	10–20 gr.	0.6–1.2 gm.
fluid extract of	30-60 min.	2.0–4.0 gm.
Hamamelis, fluid extract of	30 min.–2 fl. dr.	2.0–8.0 gm.
Hedeoma, oil of	2–5 min.	0.12–0.3 gm.
Helleborein	1/10–¼ gr.	0.006–0.016 gm.
Helleborus niger, extract of	½–2 gr.	0.03–0.12 gm.
fluid extract of	5–15 min.	0.3–1.0 gm.
tincture of	10–15 min.	0.6–1.0 gm.
Hepatica, fluid extract of	30–60 min.	2.0–4.0 gm.
Hops, extract of	3–15 gr.	0.2–1.0 gm.
fluid extract of	30–60 min.	2.0–4.0 gm.
tincture of	1–2 fl. dr.	4.0–8.0 gm.
Hydrangea, fluid extract of	30–60 min.	2.0–4.0 gm.
Hydrastine	¼–½ gr.	0.015–0.03 gm.
Hydrastis, extract of	3–10 gr.	0.2–0.6 gm.
fluid extract of	10–30 min.	0.6–2.0 gm.
tincture of	30–60 min.	2.0–4.0 gm.
Hyoscine hydrobromate	1/100–1/60 gr.	0.0006–0.001 gm.
Hyoscyamine sulphate	1/120–1/60 gr.	0.0005–0.001 gm.
Hyoscyamus, abstract of	2–3 gr.	0.12–0.2 gm.
alcoholic extract of	1–2 gr.	0.06–0.12 gm.
extract of	2–3 gr.	0.12–0.2 gm.
fluid extract of flowers	5–15 min.	0.3–1.0 gm.
of seeds	5 min.	0.3 gm.
tincture of flowers	15–30 min.	1.0–2.0 gm.
of seeds	15–30 min.	1.0–2.0 gm.
Hypnal	½–1 gr.	0.03–0.06 gm.
Hypnone	1–5 gr.	0.06–0.3 gm.
Hypophosphites, syrup of	1 fl. dr.	4.0 gm.
with iron, syrup of	1 fl. dr.	4.0 gm.
Ichthyol	2–4 gr.	0.1–0.25 gm.
Ignatia, abstract of	1–3 gr.	0.06–0.2 gm.
extract of	¼–1 gr.	0.015–0.06 gm.
fluid extract of	1–6 min.	0.06–0.35 gm.
tincture of	5–15 min.	0.3–1.0 gm.
Iodine, compound solution of	5 min.	0.3 gm.
tincture of	5–15 min.	0.3–1.0 gm.
Iodoform	1–3 gr.	0.06–0.2 gm.
Iodol	½–2 gr.	0.03–0.12 gm.
Ipecacuanha, emetic	15–30 gr.	1.0–2.0 gm.
expectorant	⅙–1 gr.	0.01–0.06 gm.
abstract of	5–30 gr.	0.3–2.0 gm.
fluid extract of, emetic	15–30 min.	1.0–2.0 gm.
syrup of	½–1 fl. dr.	2.0–4.0 gm.
wine of, emetic	3–6 fl. dr.	12.0–24.0 gm.
expectorant	5–15 min.	0.3–1.0 gm.
Iridin or Irisin	1–5 gr.	0.06–0.3 gm.
Iris, extract of	1–3 gr.	0.06–0.18 gm.
fluid extract of	5–15 min.	0.3–1.0 gm.

REMEDY.	DOSE.	
	Apothecaries' Weights and Measures.	Metric System.
Iron acetate, tincture of	15–30 min.	1.0–2.0 gm.
and ammonium citrate	5–10 gr.	0.3–0.6 gm.
sulphate	5-10 gr.	0.3–0.6 gm.
tartrate	5–15 gr.	0.3–1.0 gm.
arsenate	1/40–1/20 gr.	0.0015–0.003 gm.
benzoate	1–5 gr.	0.06–0.3 gm.
bitter wine of	1–2 fl. dr.	4.0–8.0 gm.
bromide	1–5 gr.	0.06–0.3 gm.
syrup of	15–60 min.	1.0-4.0 gm.
carbonate, saccharated	5–15 gr.	0.3–1.0 gm.
chloride	1–3 gr.	0.06–0.18 gm.
tincture of	10–30 min.	0.6–2.0 gm.
and cinchonidia citrate	5–10 gr.	0.3–0.6 gm.
citrate	5–10 gr.	0.3–0.6 gm.
compound mixture of	1–2 fl. oz.	30.0–60.0 gm.
dialyzed	5–15 min.	0.3–1.0 gm.
solution of	10–30 min.	0.6–2.0 gm.
hydrated oxide of	Tablespoonful doses in arsenical poisoning	
hypophosphite	5–10 gr.	0.3–0.6 gm.
syrup of	1 fl. dr.	4.0 gm.
iodide	1–5 gr.	0.06–0.3 gm.
syrup of	10–30 min.	0.6–2.0 gm.
lactate	1–5 gr.	0.06–0.3 gm.
magnetic oxide of	5–10 gr.	0.3–0.6 gm.
malate	5–15 gr.	0.3–1.0 gm.
nitrate, solution	8–15 min.	0.5–1.0 gm.
phosphate	1–5 gr.	0.06–0.3 gm.
pomate	5–15 gr.	0.3–1.0 gm.
and potassium tartrate	10–30 gr.	0.6–2.0 gm.
pyrophosphate	2–5 gr.	0.12–0.3 gm.
and quinia citrate	5–10 gr.	0.3–0.6 gm.
reduced	3–6 gr.	0.2–0.4 gm.
saccharated carbonate of	5–15 gr.	0.3–1.0 gm.
and strychnine citrate	1–3 gr.	0.06–0.18 gm.
subcarbonate	5–30 gr.	0.3–2.0 gm.
subsulphate	1–3 gr.	0.06–0.18 gm.
sulphate	1–3 gr.	0.06–0.18 gm.
dried	½–2 gr.	0.03–0.12 gm.
valerianate	1–3 gr.	0.06–0.18 gm.
wine of the citrate of	½–1 fl. dr.	2.0–4.0 gm.
Jaborandi, extract of	2–5 gr.	0.12–0.3 gm.
fluid extract of	10–60 min.	0.6–4.0 gm.
Jalap	5–30 gr.	0.3–2.0 gm.
abstract of	5–10 gr.	0 3–0.6 gm.
compound powder of	½ dr.	2.00 gm.
extract of	5–10 gr.	0.3–0.6 gm.
alcoholic extract of	3–6 gr.	0.18–0.35 gm.
fluid extract of	15–30 min.	1.0–2.0 gm.
resin of	4–8 gr.	0.25–0.5 gm.
tincture of	½–2 fl. dr.	2.0–8.0 gm.
Juglans, extract of	5–20 gr.	0.3–1.2 gm.
fluid extract of	1–2 fl. dr.	4.0–8.0 gm.
Juniperus, fluid extract of	30-60 min.	2.0-4.0 gm.
Kairin	2–10 gr.	0.12–0.6 gm.
Kamala	1–2 dr.	4.0–8.0 gm.
fluid extract of	30–60 min.	2.0–4.0 gm.
Kino	10–30 gr.	0.6–2.0 gm.
fluid extract of	15–30 min.	1.0–2.0 gm.
tincture of	½–2 fl. dr.	2.0–8.0 gm.
Kola, fluid extract of	10–30 min.	0.65–2.0 gm.
Koosso. See *Brayera*		

Remedy.	Dose.	
	Apothecaries' Weights and Measures.	Metric System.
Krameria	10–20 gr.	0.6–1.2 gm.
extract of	5–15 gr.	0.3–1.0 gm.
fluid extract of	20–30 min.	1.2–2.0 gm.
syrup of	1–4 fl. dr.	4.0–16.0 gm.
tincture of	½–2 fl. dr.	2.0–8.00 gm.
Lactucarium	10–15 gr.	0.6–1.0 gm.
fluid extract of	10–30 min.	0.6–2.0 gm.
syrup of	1–3 fl. dr.	4.0–12.0 gm.
Lappa, fluid extract of	30–60 min.	2.0–4.0 gm.
Lead acetate	½–3 gr.	0.03–0.18 gm.
iodide	½–3 gr.	0.03–0.18 gm.
Leptandra	20–40 gr.	1.2–2.5 gm.
extract of	3–10 gr.	0.18–0.6 gm.
fluid extract of	30–60 min.	2.0–4.0 gm.
Leptandrin	2–4 gr.	0.12–0.25 gm.
Lime, solution of	1–4 dr.	4.0–15.0 gm.
syrup of	15–30 min.	1.0-2.0 gm.
Liquor potassæ, sodæ, etc. See *Potassa, Soda, etc.*		
Liquorice, compound mixture of	1–4 fl. dr.	4.0–16.0 gm.
powder of	½–1 dr.	2.0–4.0 gm.
Lithium benzoate	5–10 gr.	0.3–0.6 gm.
bromide	2–10 gr.	0.12–0.6 gm.
carbonate	2–10 gr.	0.12–0.6 gm.
citrate	2–10 gr.	0.12–0.6 gm.
salicylate	2–10 gr.	0.12–0.6 gm.
Lobelia, fluid extract of	1–5 min.	0.06–0.3 gm.
tincture of	10–30 min.	0.6–2.0 gm.
Lupulin	5–10 gr.	0.3–0.6 gm.
fluid extract of	10–15 min.	0.6–1.0 gm.
oleoresin of	2–5 gr.	0.12–0.3 gm.
tincture of	½–2 fl. dr.	2.0–8.0 gm.
Magnesia	10–30 gr.	0.6–2.0 gm.
Magnesium carbonate	10 gr.–1 dr.	0.6–4.0 gm.
sulphate	2 dr.–1 oz.	8 0–32.0 gm.
sulphite	10–30 gr.	0.6–2.0 gm.
Male fern, oleoresin of	30 min.–1 fl. dr.	2.0–4.0 gm.
Malt, extract of	1-2 fl. dr.	4.0–8.0 gm.
Manganese binoxide	2–4 gr.	0.12–0.25 gm.
sulphate	2–10 gr.	0.12–0.6 gm.
Manna	1–2 oz.	32.0–64.0 gm.
Matico	½–2 dr.	2.0-8.0 gm.
fluid extract of	½–1 fl. dr.	2.0–4.0 gm.
tincture of	½–2 fl. dr.	2.0–8.0 gm.
Matricaria, fluid extract of	10–30 min.	0.6–2.0 gm.
Menispermum, fluid extract of	30-60 min.	2.0–4.0 gm.
Menthol	2 gr.	0.12 gm.
Mercury with chalk	2–10 gr.	0.12–0.6 gm.
corrosive chloride of	1/32–1/16 gr.	0.002–0.004 gm.
cyanide	1/16–⅛ gr.	0.004-0.008 gm.
formamidate (1 per cent. solution)	5–15 min.	0.3–1.0 gm.
green iodide of	⅙–½ gr.	0.01-0.03 gm.
mass of (blue pill)	3-10 gr.	0.2-0.6 gm.
mild chloride of	⅛–5 gr.	0.008-0.3 gm.
red iodide of	1/32–1/16 gr.	0.002-0.004 gm.
salicylate	½–1 gr.	0.03-0.06 gm.
tannate	½–1 gr.	0.03–0.06 gm.
yellow subsulphate of	¼–1 gr.	0.015-0.06 gm.
Mezereum, extract of	½–1 gr.	0.03-0.06 gm.
fluid extract of	3–10 min.	0.18–0.6 gm.
Morphine and its salts	1/16–½ gr.	0.004-0.03 gm.

REMEDY.	DOSE.	
	Apothecaries' Weights and Measures.	Metric System.
Morrhuol	1–5 gr.	0.06–0.3 gm.
Musk	2–15 gr.	0.1–1.0 gm.
tincture of	15–60 min.	1.0–4.0 gm.
Myrrh	10–30 gr.	0.6–2.0 gm.
tincture of	15–30 min.	1.0–2.0 gm.
Myrtol	2–3 gr.	0.12–0.18 gm.
Naphthaline	2–10 gr.	0.12–0.6 gm.
Naphthol	2–10 gr.	0.12–0.6 gm.
Narceine	$\frac{1}{6}$–$\frac{1}{2}$ gr.	0.01–0.03 gm.
Narcotine	3 gr.	0.18 gm.
Nectandra, fluid extract of	1–4 fl. dr.	4.0–16.0 gm.
Nitroglycerin (1 per cent. solution)	1 min.	0.06 gm.
Nux vomica, abstract of	$\frac{1}{4}$–1 gr.	0.015–0.06 gm.
extract of	$\frac{1}{8}$–$\frac{1}{2}$ gr.	0.008–0.03 gm.
fluid extract of	1–5 min.	0.06–0.3 gm.
tincture of	10–20 min.	0.6–1.2 gm.
Opium, camphorated tincture of (paregoric)	$\frac{1}{2}$–2 fl. dr.	2.0–8.0 gm.
confection of	10–40 gr.	0.6–2.5 gm.
extract of	$\frac{1}{6}$–$\frac{1}{2}$ gr.	0.01–0.03 gm.
powder	$\frac{1}{4}$–1 gr.	0.015–0.06 gm.
tincture of (laudanum)	5–15 min.	0.3–1.0 gm.
wine of	5–15 min.	0.3–1.0 gm.
Pancreatin	10–20 gr.	0.6–1.2 gm.
Papaver, extract of	$\frac{1}{2}$–2 gr.	0.03–0.12 gm.
fluid extract of	15–30 min.	1.0–2.0 gm.
Papayotin	1–5 gr.	0.06–0.3 gm.
Paracotoïn	1–3 gr.	0.06–0.18 gm.
Paraldehyde	20–60 min.	1.2–4.0 gm.
Pareira	$\frac{1}{2}$–1 dr.	2.0–4.0 gm.
extract of	10–30 gr.	0.6–2.0 gm.
fluid extract of	$\frac{1}{2}$–1 fl. dr.	2.0–4.0 gm.
tincture of	1 fl. dr.	4.0 gm.
Pelletierine sulphate	2–5 gr.	0.12–0.3 gm.
tannate	1–5 gr.	0.06–0.3 gm.
Peppermint, oil of	2–5 min.	0.12–0.3 gm.
spirit of	30–60 min.	2.0–4.0 gm.
Pepsin, pure	15 gr.–1 dr.	1.0–4.0 gm.
liquor of	2–4 fl. dr.	8.0–15.0 gm.
saccharated	30 gr.–$\frac{1}{2}$ oz.	2.0–16.0 gm.
Petroselinum fluid extract of	1–2 fl. dr.	4.0–8.0 gm.
Phenacetin	2–5 gr.	0.12–0.3 gm.
Phosphorated oil	3–5 min.	0.18–0.3 gm.
Phosphorus	$\frac{1}{100}$–$\frac{1}{75}$ gr.	0.0006–0.0008 gm.
Physostigma, extract of	$\frac{1}{16}$–$\frac{1}{6}$ gr.	0.004–0.01 gm.
fluid extract of	1–3 min.	0.06–0.18 gm.
tincture of	5–10 min.	0.3–0.6 gm.
Physostigmine salicylate	$\frac{1}{120}$–$\frac{1}{80}$ gr.	0.0005–0.0008 gm.
sulphate	$\frac{1}{120}$–$\frac{1}{80}$ gr.	0.0005–0.0008 gm.
Phytolacca, abstract of	5–15 gr.	0.3–1.00 gm.
berries, fluid extract of	5–30 min.	0.12–2.0 gm.
root, extract of	1–3 gr.	0.06–0.18 gm.
fluid extract of	5–30 min.	0.3–2.0 gm.
tincture of	10–60 min.	0.6–4.0 gm.
Phytolaccin	2–3 gr.	0.12–0.18 gm.
Picrotoxin	$\frac{1}{64}$–$\frac{1}{32}$ gr.	0.001–0.002 gm.
Pilocarpine and its salts	$\frac{1}{64}$–$\frac{1}{2}$ gr.	0.001–0.03 gm.
Pilocarpus, abstract of	5–20 gr.	0.3–1.2 gm.
fluid extract of	15–60 min.	1.0–4.0 gm.
Pimenta, fluid extract of	15–45 min.	1.2–3.0 gm.
Piper methysticum, fluid extract of	15 min. 1 fl. dr.	1.0–4.0 gm.
nigrum, fluid extract of	15–45 min.	1.0–3.0 gm.

REMEDY.	DOSE.	
	Apothecaries' Weights and Measures.	Metric System.
Piper nigrum, oleoresin of	1-3 gr.	0.06-0.2 gm.
Piperine	1-8 gr.	0.06-0.5 gm.
Piscidia erythrina, extract of	1-2 gr.	0.06-0.12 gm.
fluid extract of	10-30 min.	0.6-2.0 gm.
powder of	5-15 gr.	0.3-1.0 gm.
Podophyllum, abstract of	1-5 gr.	0.6-0.3 gm.
resin of	$\frac{1}{8}$-$\frac{1}{2}$ gr.	0.008-0.03 gm.
Pomegranate, bark of	20-30 gr.	1.2-2.0 gm.
Poppy. See *Papaver*.		
Potassa, solution of (liquor potassæ)	5-20 min.	0.3-1.2 gm.
Potassium acetate	15 gr.-1 dr.	1.0-4.0 gm.
bicarbonate	10-40 gr.	0.6-2.5 gm.
bitartrate	1-5 gr.	0.06-0.3 gm.
bromide	10 gr.-1 dr.	0.6-4.0 gm.
carbonate	5-30 gr.	0.3-2.0 gm.
chlorate	5-15 gr.	0.3-1.0 gm.
citrate	15-60 gr.	1.0-4.0 gm.
solution of	2-4 fl. dr.	8.0-16.0 gm.
cyanide	$\frac{1}{16}$-$\frac{1}{8}$ gr.	0.004-0.008 gm.
ferrocyanide	10-15 gr.	0.6-1.0 gm.
hypophosphite	5-15 gr.	0.3-1.0 gm.
iodide	2-15 gr.	0.12-1.0 gm.
mixture of the citrate of	$\frac{1}{2}$ fl. oz.	15.0 gm.
nitrate	5-15 gr.	0.3-1.0 gm.
permanganate	1-2 gr.	0.06-0.12 gm.
and sodium tartrate	$\frac{1}{2}$-1 oz.	15.0-30 0 gm.
sulphate	30 gr.-2 dr.	2.0-8.0 gm.
sulphide	1-10 gr.	0.06-0.6 gm.
sulphite	15-30 gr.	1.0-2.0 gm.
tartrate	1 dr.-1 oz.	4.0-32.0 gm.
Prinos	30 gr.-1 dr.	2.0-4.0 gm.
fluid extract	30-60 min.	2.0-4.0 gm.
Pulsatilla, fluid extract of	2-5 min.	0.12-0.3 gm.
Pyrethrum, tincture of	10-30 min.	0.6-2.0 gm.
Pyridine	1-3 gr.	0.06-0.18 gm.
Pyrodine	1-3 gr.	0.06-0.18 gm.
Quassia, extract of	1-5 gr.	0.06-0.3 gm.
fluid extract of	30-60 min.	2.0-4.0 gm.
tincture of	$\frac{1}{2}$-2 fl. dr.	2.0-8.0 gm.
Quebracho, fluid extract of	20-60 min.	1.2-4.0 gm.
Quercus, fluid extract of	30-60 min.	2.0-4.00 gm.
Quinidine	1-30 gr.	0.06-2.0 gm.
Quinine and salts	1-30 gr.	0.06-2.0 gm.
arsenate	$\frac{1}{6}$-1 gr.	0.01-0.06 gm.
Quinoidin	10-30 gr.	0.6-2.0 gm.
Resorcin	5-10 gr.	0 3-0.6 gm.
Rhamnus catharticus, fluid extract of	30-60 min.	2.0-4.0 gm.
Rhubarb	2-30 gr.	0.12-2.0 gm.
aromatic syrup of	1-4 fl. dr.	4.0-16.0 gm.
tincture of	$\frac{1}{2}$-1 fl. dr.	2.0-4.0 gm.
compound powder of	$\frac{1}{2}$-1 dr.	2.0-4.0 gm.
extract of	5-15 gr.	0.3-1.0 gm.
fluid extract of	15-40 min.	1.0-2.5 gm.
and soda, mixture of	$\frac{1}{2}$-1 fl. dr.	2.0-4.0 gm.
sweet tincture of	1-4 fl. dr.	4.0-16.0 gm.
syrup of	1-4 fl. dr.	4.0-16.0 gm.
tincture of	1-4 fl. dr.	4.0-16.0 gm.
wine of	1-2 fl. dr.	4.0-8.0 gm.
Rhus, aromatic fluid extract of	15-60 min.	1.0-4.0 gm.
glabra (cortex), fluid extract of	30-60 min.	2.0-4.0 gm.
(fructus), fluid extract of	30-60 min.	2.0-4.0 gm.

REMEDY.	DOSE.	
	Apothecaries' Weights and Measures.	Metric System.
Rhus toxicodendron	1-6 min.	0.06-0.4 gm.
Roses, fluid extract of	½-2 fl. dr.	2.0-8.0 gm.
syrup of	1-2 fl. dr.	4.0-8.0 gm.
Rubus, fluid extract of	½-2 fl. dr.	2.0-8.0 gm.
Rumex, fluid extract of	30-60 min.	2.0-4.0 gm.
Ruta, fluid extract of	15-30 min.	1.0-2.0 gm.
Sabina, fluid extract of	5-15 min.	0.3-1.0 gm.
Saccharin	½-4 gr.	0.03-0.25 gm.
Salicin	10-30 gr.	0.6-2.0 gm.
Salix, fluid extract of	½-2 fl. dr.	2.0-8.0 gm.
Salol	10-20 gr.	0.6-1.2 gm.
Salvia, fluid extract of	½-2 fl. dr.	2.0-8.0 gm.
Sambucus, fluid extract of	½-2 fl. dr.	2.0-8.0 gm.
Sandal-wood, oil of	15-20 min.	1.0-1.2 gm.
Sanguinaria	1-5 gr.	0.06-0.3 gm.
fluid extract of	5-10 min.	0.3-0.6 gm.
tincture of	10-40 min.	0.6-2.5 gm.
Santonica	10-30 gr.	0.6-2.0 gm.
fluid extract of	15-60 min.	1.0-4.0 gm.
Santonin	1-4 gr.	0.06-0.25 gm.
Sarsaparilla, compound fluid extract of	½-2 fl. dr.	2.0-8.0 gm.
compound syrup of	1-4 fl. dr.	4.0-16.0 gm.
fluid extract of	½-2 fl. dr.	2.0-8.0 gm.
Sassafras, fluid extract of	½-2 fl. dr.	2.0-8.0 gm.
Savine, oil of	2-5 min.	0.12-0.3 gm.
Scammony	5-15 gr.	0.3-1.0 gm.
resin of	2-10 gr.	0.12-0.6 gm.
Scoparius, fluid extract of	½-1 fl. dr.	2.0-4.0 gm.
Scutellaria, fluid extract of	1-2 fl. dr.	4.0-8.0 gm.
Scutellarine	1-3 gr.	0.06-0.18 gm.
Senega, abstract of	4-10 gr.	0.25-0.6 gm.
fluid extract of	8-15 min.	0.5-1.0 gm.
syrup of	½-2 fl. dr.	2.0-8.0 gm.
Senna	10-60 gr.	0.6-4.0 gm.
compound infusion of	1-2 oz.	32.0-64.0 gm.
confection of	1-2 dr.	4.0-8.0 gm.
fluid extract of	1-4 fl. dr.	4.0-15.0 gm.
infusion of	4 fl. oz.	125.0 gm.
syrup of	1-4 fl. dr.	4.0-16.0 gm.
tincture of	2 fl. dr.-1 fl. oz.	8.0-30.0 gm.
Serpentaria, fluid extract of	30 min.-1 fl. dr.	2.0-4.0 gm.
tincture of	½-2 fl. dr.	2.0-8.0 gm.
Silver iodide	½-2 gr.	0.03-0.12 gm.
nitrate	¼-½ gr.	0.015-0.03 gm.
oxide	½-1 gr.	0.03-0.06 gm.
Simaruba, fluid extract of	15-30 min.	1.0-2.0 gm.
Soda, solution of (liquor sodæ)	5-20 min.	0.3-1.2 gm.
Sodium acetate	15 gr.-1 dr.	1.0-4.0 gm.
arsenate	$\frac{1}{60}$-$\frac{1}{10}$ gr.	0.001-0.006 gm.
benzoate	5-30 gr.	0.3-2.0 gm.
bicarbonate	10-30 gr.	0.6-2.0 gm.
bisulphite	10-30 gr.	0.6-2.0 gm.
borate	10-30 gr.	0.6-2.0 gm.
bromide	10-30 gr.	0.6-2.0 gm.
carbonate	10-30 gr.	0.6-2.0 gm.
chlorate	5-30 gr.	0.3-2.0 gm.
citrate	1-10 dr.	4.0-40.0 gm.
hypophosphite	5-15 gr.	0.3-1.0 gm.
hyposulphite	10-30 gr.	0.6-2.0 gm.
iodide	5-20 gr.	0.3-1.2 gm.
nitrite	1-4 gr.	0.06-0.25 gm.

Remedy.	Dose.	
	Apothecaries' Weights and Measures.	Metric System.
Sodium phosphate	2–10 gr.	0.12–0.6 gm.
salicylate	10–20 gr.	0.6–1.2 gm.
sulphate	1–4 dr.	4.0–16.0 gm.
sulphite	10–30 gr.	0.6–2.0 gm.
Sparteine sulphate	1/25 gr.	0.002 gm.
Spigelia, fluid extract of	15–60 min.	1.0–4.0 gm.
and senna, fluid extract of	1/2–2 fl. dr.	2.0–8.0 gm.
Squill, compound fluid extract of	5–30 min.	0.3–1.8 gm.
syrup of	15–30 min.	1.0–2.0 gm.
fluid extract of	5–30 min.	0.3–1.8 gm.
syrup of	1/2–1 fl. dr.	2.0–4.0 gm.
tincture of	10–60 min.	0.6–4.0 gm.
Stillingia, fluid extract of	15–60 min.	1.0–4.0 gm.
Stramonium, extract of	1/2 gr.	0.03 gm.
fluid extract of	1–4 min.	0.06–0.25 gm.
leaves, alcoholic extract of	1/4–1/2 gr.	0.015–0.03 gm.
tincture of	8–15 min.	0.5–1.0 gm.
seeds, extract of	1/4–1/2 gr.	0.015–0.03 gm.
tincture of	6–15 min.	0.4–1.00 gm.
Strontium bromide	20–30 gr.	1.2–2.0 gm.
iodide	10–20 gr.	0.6–1.2 gm.
lactate	20–30 gr.	1.2–2.0 gm.
phosphate	20–30 gr.	1.2–2.0 gm.
Strophanthus, tincture of	3–8 min.	0.2–0.5 gm.
Strophantin	1/120–1/60 gr.	0.0005–0.001 gm.
Strychnine and its salts	1/64–1/16 gr.	0.001–0.004 gm.
Sulphonal	15–30 gr.	1.0–2.0 gm.
Sulphur	1–3 dr.	4.0–12.0 gm.
Sumbul, fluid extract of	15–60 min.	1.0–4.0 gm.
tincture of	10–30 min.	0.6–2.0 gm.
Taraxacum, extract of	5–15 gr.	0.3–1.0 gm.
fluid extract of	1/2–1 fl. dr.	2.0–4.0 gm.
Terebene	5–10 min.	0 3–0.6 gm.
Terpine hydrate	2–5 gr.	0.12–0.3 gm.
Terpinol	1/20 gr.	0.003 gm.
Thallin, sulphate of	1–5 gr.	0.06–0.3 gm.
tartrate of	1–5 gr.	0.06–0.3 gm.
Theine	1–2 gr.	0.06–0.12 gm.
Thuja, fluid extract of	10–15 gr.	0.6–1.0 gm.
Thymol	1–5 gr.	0.06–0.3 gm.
Toxicodendron, fluid extract of	1–5 min.	0.06–0.3 gm.
Triticum, fluid extract of	1–2 fl. dr.	4.0–8.0 gm.
Turpentine, oil of	5–30 min.	0.3–2.0 gm.
Urethane	10–30 gr.	0.6–2.0 gm.
Ustilago maidis, fluid extract of	15–60 min.	1.0–4.0 gm.
Uva ursi, fluid extract of	1/2–1 fl. dr.	2.0–4.0 gm.
Valerian, abstract of	10–15 gr.	0.6–1.0 gm.
ammoniated tincture of	1/2–2 fl. dr.	2.0–8.0 gm.
extract of	5–15 gr.	0.3–1.0 gm.
fluid extract of	1/2–1 fl. dr.	2.0–4.0 gm.
oil of	4–5 min.	0.24–0.3 gm.
tincture of	1/2–2 fl. dr.	2.0–8.0 gm.
Veratrine	1/60–1/20 gr.	0.001–0.003 gm.
Veratrum viride, abstract of	1–2 gr.	0.06–0.12 gm.
fluid extract of	1–5 min.	0.06–0.3 gm.
tincture of	3–5 min.	0.18–0.3 gm.
Verbena, fluid extract of	15–60 min.	1.0–4.0 gm.
Viburnum, fluid extract of	1–2 fl. dr.	4.0–8.0 gm.
Vinegar. See *Acetum*.		
Wahoo. See *Euonymus*.		
Wild-cherry bark	1/2–1 dr.	2.0–4.0 gm.

REMEDY.	DOSE.	
	Apothecaries' Weights and Measures.	Metric System.
Wild-cherry bark, fluid extract of	30-60 min.	2.0-4.0 gm.
infusion of	1-2 fl. oz.	30.0-60.0 gm.
syrup of	2-4 fl. dr.	8.0-16.0 gm.
Wintergreen, oil of	1-20 min.	0.06-1.2 gm.
Wormseed, oil of	4-8 min.	0.24-0.5 gm.
Xanthoxylum bark, fluid extract of	15-30 min.	1.0-2.0 gm.
fruit, fluid extract of	15-30 min.	1.0-2.0 gm.
Zinc acetate	1-2 gr.	0.06-0.12 gm.
bromide	$\frac{1}{2}$-2 gr.	0.03-0.12 gm.
iodide	$\frac{1}{2}$-3 gr.	0.03-0.18 gm.
oxide	2-8 gr.	0.12-0.5 gm.
phosphide	$\frac{1}{20}$-$\frac{1}{10}$ gr.	0.003-0.006 gm.
sulphate (alterative)	$\frac{1}{4}$-1 gr.	0.015-0.06 gm.
(emetic)	10-30 gr.	0.6-2.0 gm.
syrup of iodide of	20-40 min.	1.2-2.5 gm.
valerianate	1-4 gr.	0.06-0.2 gm.
Zingiber. See *Ginger*.		

TABLES OF RELATIVE WEIGHTS AND MEASURES IN THE METRIC AND APOTHECARIES' SYSTEMS.

(See Oldberg's Manual of Weights and Measures.)

MILLIGRAMMES IN GRAINS.

Milligramme.		Grain.	Milligrammes.		Grain.	Milligrammes.		Grain.
0.1	=	1/600	1	=	1/60	8	=	1/8
0.2	=	1/300	1.2	=	1/50	9	=	1/7
0.3	=	1/200	1.6	=	1/40	10	=	1/6
0.4	=	1/150	2	=	1/30	12	=	1/5
0.5	=	1/120	3	=	1/20	16	=	1/4
0.6	=	1/100	4	=	1/15	20	=	1/3
0.7	=	1/90	5	=	1/12	30	=	1/2
0.8	=	1/80	6	=	1/10	60	=	1
0.9	=	1/70	7	=	1/9			

CENTIGRAMMES IN GRAINS.

Centigrammes (or Cent.)		Grain.	Centigrammes. (or Cent.)		Grains.	Centigrammes (or Cent.)		Grains.
1	=	1/6	6	=	1	18	=	3
2	=	1/3	7	=	1 1/6	25	=	4
3	=	1/2	9	=	1 1/2	50	=	8
4	=	2/3	10	=	1 2/3	75	=	12
5	=	5/6	12	=	2	100	=	16

GRAMMES IN GRAINS.

Grammes.		Grains.	Grammes.		Grains.	Grammes.		Grains.
0.001	=	1/60	11	=	176	27	=	432
0.010	=	1/6	12	=	192	28	=	448
0.100	=	1 2/3	13	=	208	29	=	464
0.250	=	4	14	=	224	30	=	480
0.500	=	8	15	=	240	31	=	496
0.750	=	12	16	=	256	32	=	512
1	=	16	17	=	272	33	=	528
1.50	=	24	18	=	288	34	=	544
2	=	32	19	=	304	35	=	560
3	=	48	20	=	320	36	=	576
4	=	64	21	=	336	37	=	592
5	=	80	22	=	352	38	=	608
6	=	96	23	=	368	39	=	624
7	=	112	24	=	384	40	=	640
8	=	128	25	=	400	50	=	800
9	=	144	26	=	416	100	=	1600
10	=	160						

Cubic Centimètres (or Fluidgrammes) in U. S. Apothecaries' Fluidrachms.

Cubic Centimètres.		U. S. Fluidrachms.	Cubic Centimètres.		U. S. Fluidrachms.	Cubic Centimètres.		U. S. Fluidrachms.
1	=	¼	9	=	2¼	16	=	4
2	=	½	10	=	2½	20	=	5
3	=	¾	11	=	2¾	24	=	6
4	=	1	12	=	3	28	=	7
5	=	1¼	13	=	3¼	32	=	8
6	=	1½	14	=	3½	48	=	12
7	=	1¾	15	=	3¾	64	=	16
8	=	2						

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Duboisine more useful than hyoscine, 188
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Trional, in 15-grain (1.0) doses, 374, 586
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Chloroform inhalations, preceded by laudanum, by mouth or rectum, or morphine, gr. $\frac{1}{6}$ (0.01), with atropine, gr. $\frac{1}{60}$ (0.001), hypodermically, if death threatens during chill, 588
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Ipecac or zinc sulphate, as an emetic, if chill follows full meal, 588
Methylene blue, 1 to 4 grains (0.05–0.2), 273
Phenocoll, sometimes useful, 313
Podophyllin, gr. $\frac{1}{10}$ to $\frac{1}{8}$ (0.006–0.007), preceding quinine, if constipation is present, 587
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Ammonium chloride, useful in subacute types, 66
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Iodide of potassium, if ammonium chloride fails to relieve, 225
Leptandra, fluid extract, dose 20 minims to 1 drachm (1.3–4.0), 251
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Paracentesis, 589
Pilocarpine, internally if vitreous becomes opaque, also in gonorrhœal types, 589
Salicylic acid or oil of gaultheria, followed later by potassium iodide, in rheumatic iritis, 590
Saline laxatives, during course of disease, followed by iron, after cessation of specific treatment, 590
Scopolamine in early stages of, and in plastic, 344
Turpentine accompanied by potassium iodide, in plastic iritis, following secondary syphilis, 590
Zollicoffer's mixture, useful in chronic types, 590

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Cantharis, recommended in irritable bladder of women and children, 121
Cimicifuga, in uterine irritability, 154
Hops, in vesical irritability, 215
Hydrocyanic acid in irritability of the stomach, 218
Hyoscyamus for vesical irritability with incontinence, 221
Petrolatum, as a soothing agent in gastointestinal types, 310
Piperazine, in bladder irritation due to excess of uric acid, 323
Potassium bromide, in irritability of pharynx, 101

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Calomel, gr. ⅙ (0.01), every half-hour till gr. ½ (0.025) is taken, if due to cold, 267
Carbolic acid, gr. 10 (0.65), with water and glycerin, each 2 drachms (8.0), locally applied in itching of jaundice, 126
Citric acid, in catarrhal form, 163
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Manganese sulphate, may be tried in malarial types, 257
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Antisyphilitic treatment, if due to syphilis, 590
Atropine, in ciliary congestion, to prevent iritis, 590
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Thymol iodide, as a dusting powder, 371

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Boric acid, solution, to relieve congestion, 591
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Cold-water douche on closed eyelid, to relieve photophobia, 591
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Dark glasses, to protect eyes, 591
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Creosote spray in subacute laryngitis, 179
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Dover's powder, if necessary, to give rest, 296
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Ammonio-ferric alum gr. 2 to 5 (0.1–0.25), in atonic types, 237
Belladonna, gr. 1 to 2 (0.05–0.1), with tannic acid, gr. 6 to 8 (0.5), applied on cotton, in disease of uterine cervix, 91
Cantharidal collodion, applied over groins to produce blister, 595
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Hæmatoxylon, used internally, of service, 212
Hot sitz-bath, or vaginal injections of hot water, if due to uterine congestion, 410
Hydrastis, injections, 216
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Nitrate of silver, when there is cervical ulceration, 280
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Prescription for injection, 596
Ringer's prescription for wash, 596
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Cod-liver oil, 169
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Iodine externally and iodide of potassium internally for enlargement of the spleen, 226
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Bromides and chloral, best agents to allay nervous symptoms, 599
Calomel, gr. ½ (0.025), with opium gr. ¼ (0.012), every half-hour, in early stage, until effect is manifested; the deodorized tincture, gtt. 2 to 5 (0.1-0.3), every two hours, or less, preferable to powder of opium in some cases, 264, 598
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Monsel's solution (50 per cent.) full strength locally applied, if due to polypus, 241
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Rue, in atonic menorrhagia, 333
Savine, oil of, gtt. 5 to 10 (0.3-0.65), in capsule or emulsion, every three or four hours, as a tonic in menorrhagia, 343
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Flaxseed, as a soothing demulcent, 203
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Opium, suppositories, gr. ¼ (0.015), useful in rectal inflammation, if not an acute catarrh, 296
Pareira, useful in chronic genito-urinary inflammation, 306
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Chloroform liniment, 600
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Iodine ointment, pure or diluted with lard, 600
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Galvano-cautery, or strong silver nitrate solution, if ulcerations are present, 601
Hydrogen peroxide, 601
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Listerine, may be added to Dobell's solution, to relieve odor, 601
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Potassium permanganate, useful; painful if sensation is not entirely lost, 601
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POISONING FROM—

Acetanilid.

Supportive measures, stimulants, external heat, belladonna to maintain blood-pressure, strychnine to counteract respiratory failure, and oxygen inhalations to overcome cyanosis, 44

Acetate of Zinc.

Treatment same as for gastro-enteritis, 544

Acetic Acid.

Large amounts of milk, alkaline liquids, and general treatment for gastro-enteritis, 47

Aconite.

Keep patient in prone position, with feet higher than head. Hot applications; emetics contraindicated; evacuate stomach by siphon or stomach-pump. Ether hypodermically, followed by alcohol, and this by digitalis. Artificial respiration and amyl nitrite, a few whiffs, no more, if heart fails; Atropine; Strychnine, 48

Alcohol (Acute).

External heat, digitalis and strychnine hypodermically, in coma, if heart fails. Belladonna, if skin is relaxed and

clammy, and counter-irritation to nape of neck, for brain symptoms. After-treatment, ammonia, spices, spirit of Mindererus; emollients in gastritis. Ice, aconite, hydrochloric acid, or ipecac in minute dose, and counter-irritation for vomiting. Jalap, gr. 40 (2.6), elaterium, gr. $\frac{1}{6}$ (0.011), or calomel and salines, as purgatives, 53

Fowler's solution for morning vomiting, 83

Alcohol (Chronic).

Withdrawal of drug, at once or gradually. Highly seasoned broths, predigested foods, and morphine or coca, in small dose, if weakness is marked. Capsicum prescriptions (pages 55, 122), 54

Antimony.

Large doses of tannic acid, external heat, alcohol, digitalis, and opium hypodermically, if respiration is not too feeble. If necessary to use opium, it should be accompanied by strychnine. Prone position, the patient vomiting into towels. Stomach-pump, if vomiting is absent, 71; Atropine, 93

Antipyrin.

Maintain bodily heat, stimulants, atropine, and oxygen inhalations, if cyanosis is alarming, 75

Arsenic (Acute and Chronic).

Stomach-pump, external heat, stimulants, and the chemical antidote, hydrated sesquioxide of iron and magnesia. Magnesia also useful by itself. Opium should follow antidote, to allay pain, also large draughts of water to flush kidneys and dilute poison. For chronic poisoning, iodide of potassium, tonics, electricity, and out-of-door life, 85

Belladonna.

External heat if collapse supervene, and strychnine to support respiration. The physiological antidote, opium, may be carefully given, 93

Carbolic Acid.

Soluble sulphates, as Epsom or Glauber salts, warm mucilaginous drinks, hot applications to extremities, digitalis, strychnine, and counter-irritation over abdomen. Emetics and stomach-pump should be used if possible, 125

Chloral.

External heat, emetics in early and stomach-pump in later stages. Strychnine or atropine to stimulate respiration. Digitalis, preceded by ether, ammonia, brandy, or whiskey. Prone position, feet being elevated, 135

Chloroform.

Artificial respiration, ether and hot brandy hypodermically. Poles of battery with rapidly interrupted current swept over body, not over diaphragm or phrenic nerve. Place patient with head downward. Compression of the abdomen and limbs; compression and massage of the præcordium. Atropine, strychnine, and digitalis to stimulate the heart and respiration. Laborde's lingual traction, 146

Cocaine.

Ammonia, coffee, strychnine, ether and alcohol. If convulsive in type, treat same as strychnine poisoning, 167

Colchicum.

Tannic acid, emetics, and stomach-pump. Opium to relieve pain, and oils. Atropine and stimulants if collapse comes on, 172

Conium.

Emetics or stomach-pump, strychnine as a nervous and respiratory stimulant, external heat and cardiac stimulants, if circulation fails, 176

Copper.

Yellow prussiate of potassium, sweet oil, white of egg; followed instantly by emetics or stomach-pump. If emesis or purgation is present, emetics are contra-indicated; instead, mustard plaster over abdomen and opium internally are to be employed, 177

Corrosive Sublimate.

Large amounts of white of egg, followed by stomach-pump, external heat, stimulants, 265

Croton Oil.

Treatment same as for gastro-enteritis, 544

Digitalis.

Tannic acid as a chemical antidote, emetics or stomach-pump, external heat to abdomen and aconite as a physiological antidote. Maintain horizontal position, 186

Elaterium.

Treatment same as for gastro-enteritis, 544

Ether.

Artificial respiration, lowering head if face is pale; strychnine, atropine, and digitalis hypodermically, or intravenous injection of ammonia to stimulate heart and respiration; frictions and hot applications; ether dashed on chest and abdomen; Laborde's method of traction of the tongue, 195

Eucaine.

Treatment like that of cocaine intoxication, 167

Gelsemium.

Emetics and stomach-pump, digitalis, atropine, and ammonia as cardiac stimu-

lants; external heat, strychnine, and atropine for respiratory centre, 206

Iodine.

Emetics or stomach-pump, large amounts of starch, hot applications, and hypodermic injections of alcohol, ammonia, atropine, digitalis, or strychnine, 228

Iodoform.

Sodium bicarbonate to combine with iodine, alcohol, diuretics, and hot blankets; saline transfusion, 232

Lead (Acute).

Epsom or Glauber's salts, in large amounts; alum; emetics or stomach-pump. Hot applications and opium to relieve pain, 247

Lead (Chronic.

Jalap and calomel with opium or alum, gr. 2 (0.1), in full dose, valuable in lead colic. Blister to back of neck, revulsives and pilocarpine in cerebral inflammation. Iodide of potassium to eliminate lead. Strychnine in progressive paralysis. Electricity and baths of sulphuret of potassium, 249

Mineral Acids.

Alkalies, such as magnesium, lime, whitewash, and soap as antidotes; white of egg, external heat, oils, and opium, to relieve irritation.

Monsel's Solution.

Soap, 242 So Semi [illegible]

Nitrate of Silver (Acute).

Common salt as the chemical antidote, opium and oils to allay irritation; also large amounts of milk and soap and water; maintain bodily heat, 278

Nitrate of Silver (Chronic).

Iodide of potassium, to aid in eliminating poison, 279

Nux Vomica and its Alkaloids.

Inhalations of amyl nitrite, to prevent convulsive tendencies, at the same time use stomach-pump. Tannic acid followed by physiological antidotes, potassium bromide, gr. 60 (2.0), with chloral, gr. 20 (1.3). If convulsions prevent swallowing, chloroform patient carefully and give antidotes by rectum in starch-water. Amyl nitrite, hypodermically, if relaxation does not occur, 289

Opium (Acute).

Emetics or stomach-pump, tannic acid, black coffee, electricity, and other measures to keep patient awake. Atropine or strychnine, hypodermically, if respiration fails. Alcohol, ammonia, and external heat. Artificial respiration may be necessary; repeated washing out of stomach. Permanganate of potassium, 293

Opium (Chronic).

Decrease a sixth or fourth of customary amount each twenty-four hours. Cocaine not advisable as a substitute, as the cocaine-habit may be established. Digitalis and strychnine if heart fails, 295

Phosphorus.

Permanganate of potassium, 1 per cent. solution, or peroxide of hydrogen. Sulphate of copper is too poisonous in itself, 316

Physostigma.

Atropine as a physiological antidote, external heat, and cardiac and respiratory stimulants, 318

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Treatment same as for gastro-enteritis, 544

Strychnine. (See Nux Vomica.)

Veratrum Viride.

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Enema, of hot water, 1 pint (500.0), after cessation of bleeding, 630

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Ether, hypodermically, if symptoms of shock are manifested, followed by small doses of hot, strong brandy and water, and warm milk, 630

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Cantharides, 121

PRURIGO.

Cantharides, 121

PRURITUS, 622

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Boric acid, 98
Calomel and lard (1 drachm to the ounce [4.0 : 32.0]), locally applied, 269
Carbolic acid, 623
Chloride of calcium, prescription for, 111
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Arsenic, 83
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Gallic acid, ointment, 204
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